



FINAL CONSTRUCTION DOCUMENTS SPECIFICATIONS

Water Tower Improvement

Project Number: 544-15-205

**William Jennings Bryan Dorn VA Medical Center
Columbia, SC**

Feb 28, 2018



Planning, Design, Construction
and Related Services

**Dixon
Engineering, Inc.**

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SECTION 00 01 15
LIST OF DRAWINGS

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

Drawing No.	Title
	<u>GENERAL</u>
GI001	Cover Sheet: Drawings Index, Maps & General Notes
	<u>ARCHITECTURAL</u>
C-101	Site Layout and Details
AE101	Partial Floor Plan, Elevations, Sections, Details
AE501	Water Tower Details
AE502	Water Monitoring System Details (For Reference Only)

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SECTION 01 00 00
GENERAL REQUIREMENTS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 SAFETY REQUIREMENTS

Refer to section 01 35 26, SAFETY REQUIREMENTS for safety and infection control requirements.

1.2 GENERAL INTENTION

- A. Contractor shall completely prepare site, including demolition and removal of existing water tank components, proper disposal of hazardous materials, and furnish all labor and materials to correctly perform work for: W.J.B. Dorn VA Medical Center
Water Tower Improvement
VA Project # 544-201-206
Columbia, SC
as required by drawings and specifications.
- B. Visits to the site by Bidders beyond the Pre-Bid Meeting may be made only by appointment with the Contracting Officer's Representative.
- C. Offices of Atriax, PLLC, 102 3rd Ave., N.E., Hickory, NC 28601, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.
- D. Before placement and installation of work subject to tests by testing laboratory retained by Department of Veterans Affairs, the Contractor shall notify the COR in sufficient time to enable testing laboratory personnel to be present at the site in time for proper taking and testing of specimens and field inspection. Such prior notice shall be not less than three work days unless otherwise designated by the COR.
- E. All employees of Contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

F. The intent of the contract documents (specifications, drawings, and existing photos) is to provide sufficient information to the Contractor that the Contractor's bid price will provide the WJB Dorn VA Medical Center with a completely refurbished, functional water tank with water quality monitoring systems. If individual components of an assembly appear to not be described or shown (fully or in part), the Contractor shall provide and install such components, or perform such work that would normally be included in a project of this type. Such additional components, or work, will be included in the Contractor's bid price and will be installed, or performed, at no additional cost to the WJB Dorn VA Medical Center.

1.3 STATEMENT OF BID ITEM(S)

A. BID ITEM I, GENERAL CONSTRUCTION: WATER TOWER IMPROVEMENTS

The tank is a 300,000 gallon double ellipse with a low water line of 106.8 ft. located on East Woodland Trail Rd. Columbia, South Carolina at the Dorn V.A. Medical Center.

Work includes, but is not limited to, general construction, alterations, hazardous materials removal/disposal, removal/installation of certain water tank components, painting of the interior and exterior of the tank, and certain other items as delineated by these contract documents as follows:

Exterior: Abrasive blast clean to a SSPC-SP6 commercial standard with containment, apply a four (4) coat zinc epoxy urethane system, the orange FAA sections are to have a fluoropolymer topcoat.

Wet Interior: Abrasive blast clean to a SSPC-SP10 near white metal standard, apply a three (3) coat zinc epoxy system, and apply a polyurethane caulk to the roof lap seams.

Pit Piping: Abrasive blast clean to a SSPC-SP6 commercial standard, and apply a two (2) coat epoxy system.

Foundation: Abrasive blast clean and apply a two (2) coat epoxy system.

Cathodic Protection: Install an impressed current cathodic protection system.

Splash Pad: Install a concrete splash pad at the overflow pipe discharge.

Repairs:

1. Replace wet interior roof hatch.
2. Install bottom bracket on the wet interior ladder fall prevention device.
3. Re-weld wet interior ladder.
4. Install new sidewall ladder with platform.
5. Replace roof vent.
6. Weld cathodic covers.
7. Install cathodic clips and coupling.
8. Install roof handrail with painter's rail.
9. Relocate the antennas and aviation light to the handrail.
10. Install bowl safety couplings.
11. Remove level indicator.

The Contractor shall include in BID ITEM I the costs for the Water Tank Improvement Consultant services as delineated in 01 45 29.10, TESTING SERVICES.

B. BID ITEM II, MISCELLANEOUS ITEMS: POTABLE WATER ANALYTICS (PWA) SYSTEM

Work includes, but is not limited to, the installation of a fully automated and integrated Potable Water Analytics (PWA) water monitoring system with system components that provide continuous chlorine residual monitoring, diagnostic exchange, and analytics software.

General Note: The Contractor shall protect all sensitive equipment including government equipment located within the area of construction during all phases of the work.

1.4 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

- A. Contract documents may be obtained from www.fbo.gov where the solicitation is posted. All copies of the contract documents required for the construction will be acquired at the Contractor's expense.

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.
1. The Contractor shall develop a Security Plan addressing all security issues contained in this section and any other security measures that the Contractor may determine are applicable to this project.
3. The Security Plan shall be reviewed by the COR prior to the project work Commencing.
4. 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's employees shall not enter the project site without appropriate badge. They may also be subject to inspection of their personal effects when entering or leaving the project site.
2. Before starting work the Contractor shall give one week's notice to the COR so that security arrangements can be provided for the employees. This notice is separate from any notices required for utility shutdown described later in this section.
3. No photography of VA premises is allowed without written permission of the Contracting Officer.
4. VA reserves the right to close down or shut down the project site and order Contractor's employees off the premises in the event of a national emergency. The Contractor may return to the site only with the written approval of the Contracting Officer.

C. Guards: Not Required

D. Key Control:

1. The Contractor shall provide duplicate keys and lock combinations to the COR for the purpose of security inspections of every area of project including tool boxes and parked machines and take any emergency action.

2. The Contractor shall turn over all permanent lock cylinders to the VA locksmith for permanent installation. See Section 08 71 00, DOOR HARDWARE and coordinate.

E. Document Control:

1. Before starting any work, the Contractor/Sub Contractors shall submit an electronic security memorandum describing the approach to following goals and maintaining confidentiality of "sensitive information".
2. The Contractor is responsible for safekeeping of all drawings, project manual and other project information. This information shall be shared only with those with a specific need to accomplish the project.
3. Certain documents, sketches, videos or photographs and drawings may be marked "Law Enforcement Sensitive" or "Sensitive Unclassified". Secure such information in separate containers and limit the access to only those who will need it for the project. Return the information to the Contracting Officer upon request.
4. These security documents shall not be removed or transmitted from the project site without the written approval of Contracting Officer.
5. All paper waste or electronic media such as CD's and diskettes shall be shredded and destroyed in a manner acceptable to the VA.
6. Notify Contracting Officer and Site Security Officer immediately when there is a loss or compromise of "sensitive information".
7. All electronic information shall be stored in specified location following VA standards and procedures using an Engineering Document Management Software (EDMS).
 - a. Security, access and maintenance of all project documents, both scanned and electronic shall be performed and tracked through the EDMS system.

- b. "Sensitive information" including drawings and other documents may be attached to e-mail provided all VA encryption procedures are followed.
- F. Motor Vehicle Restrictions
- 1. Vehicle authorization request shall be required for any vehicle entering the site and such request 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.
 - 2. A limited number of (2 to 5) permits shall be issued for Contractor and its employees for parking in designated areas only.

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. 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 will not be permitted for the storage of materials required to perform the work associated with this project.
- C. The Contractor shall, under regulations prescribed by the COR, use only established roadways. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.
- D. Working space and space available for storing materials shall be as determined by the COR.
- E. Workmen are subject to rules of the WJB Dorn VA Medical Center applicable to their conduct.

- F. Execute work so as to interfere as little as possible with normal functioning of the WJB Dorn VA Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
1. Do not store materials and equipment in other than assigned areas.
 2. Schedule delivery of materials and equipment to immediate construction working areas in quantities sufficient for not more than two work days. Provide unobstructed access to the VA Medical Center areas required to remain in operation.
- G. Phasing: Not Required
- H. Building No. Part of Bldg.: Not Required
- I. Construction Fence: Not Required
- J. When the water tower construction site is turned over to the Contractor, the Contractor shall accept entire responsibility including upkeep and maintenance therefore:
- K. Utilities Services: Maintain existing utility services for the WJB Dorn VA Medical Center at all times. Provide temporary facilities, labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by the COR.
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 the COR
 2. Contractor shall submit a request to interrupt any such services to the COR, in writing, 7 days in advance of proposed interruption.

- Request shall state reason, date, exact time of, and approximate duration of such interruption.
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 WJB Dorn VA Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
 4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COR.
 5. In case of a contract construction emergency, service will be interrupted on approval of the COR. Such approval will be confirmed in writing as soon as practical.
 6. Whenever it is required that a fee of any sort be paid to a public utility provider for work associate with this construction project, for such items as water or electricity, payment of such fee shall be the responsibility of the Contractor.
- L. Abandoned Lines: Not Required
- M. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.
- N. Coordinate the work for this contract with other construction operations as directed by the COR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.
- O. Not Required

1.7 ALTERATIONS: NOT REQUIRED

1.8 DISPOSAL AND RETENTION: NOT REQUIRED

1.9 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.
- 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 may have the necessary work performed and charge the cost to the Contractor.

1.10 RESTORATION: NOT REQUIRED

1.11 PHYSICAL DATA: NOT REQUIRED

1.12 PROFESSIONAL SURVEYING SERVICES: NOT REQUIRED

1.13 LAYOUT OF WORK: NOT REQUIRED

1.14 AS-BUILT RECORDS

- A. The contractor shall maintain two complete records of all water tank refurbishments which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
- B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built information shall be made available for the COR review, as often as requested.
- C. Contractor shall deliver two approved completed sets of as-built information in the electronic version (scanned PDF) to the COR within

15 calendar days after each completed phase and after the acceptance of the project by the COR.

D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.15 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on the WJB Dorn VA Medical Center property. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.16 RESIDENT ENGINEER'S FIELD OFFICE: NOT REQUIRED

1.17 TEMPORARY USE OF MECHANICAL AND ELECTRICAL EQUIPMENT: NOT REQUIRED

1.18 TEMPORARY USE OF EXISTING ELEVATORS: NOT REQUIRED

1.19 TEMPORARY USE OF NEW ELEVATORS: NOT REQUIRED

1.20 TEMPORARY TOILETS

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

1.21 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Government shall make all reasonably required amounts of utilities available to the Contractor from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge.

B. Not Used

C. Not Used

D. Not Used

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

1. Obtain electricity by connecting to the WJB Dorn VA Medical Center 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.

G. Fuel: Not Used

1.22 NEW TELEPHONE EQUIPMENT: NOT REQUIRED

1.23 TESTS

- A. As per specification section 23 05 93 the contractor shall provide a written testing and commissioning plan complete with component level, equipment level, sub-system level and system level breakdowns. The plan will provide a schedule and a written sequence of what will be tested, how and what the expected outcome will be. This document will be submitted for approval prior to commencing work. The contractor shall document the results of the approved plan and submit for approval with the as built documentation.

B. Not Used

- C. Conduct final tests required in various sections of specifications in presence of an authorized representative of the Contracting Officer. Contractor shall furnish all labor, materials, equipment, instruments, and forms, to conduct and record such tests.

D. Not Used

E. Not Used

F. Not Used

1.24 INSTRUCTIONS

- A. Contractor shall furnish Maintenance and Operating manuals (hard copies and electronic) and verbal instructions when required by the various sections of the specifications and as hereinafter specified.

B. Manuals: Maintenance and operating manuals and one compact disc (four hard copies and one electronic copy each) for each separate piece of equipment shall be delivered to the COR coincidental with the delivery of the equipment to the job site. Manuals shall be complete, detailed guides for the maintenance and operation of equipment. They shall include complete information necessary for starting, adjusting, maintaining in continuous operation for long periods of time and dismantling and reassembling of the complete units and sub-assembly components. Manuals shall include an index covering all component parts clearly cross-referenced to diagrams and illustrations. Illustrations shall include "exploded" views showing and identifying each separate item. Emphasis shall be placed on the use of special tools and instruments. The function of each piece of equipment, component, accessory and control shall be clearly and thoroughly explained. All necessary precautions for the operation of the equipment and the reason for each precaution shall be clearly set forth. Manuals must reference the exact model, style and size of the piece of equipment and system being furnished. Manuals referencing equipment similar to but of a different model, style, and size than that furnished will not be accepted.

C. Instructions: Contractor shall provide qualified, factory-trained manufacturers' representatives to give detailed training to assigned Department of Veterans Affairs personnel in the operation and complete maintenance for each piece of equipment. All such training will be at the job site. These requirements are more specifically detailed in the various technical sections. Instructions for different items of equipment that are component parts of a complete system, shall be given in an integrated, progressive manner. All instructors for every piece of component equipment in a system shall be available until instructions for all items included in the system have been completed. This is to assure proper instruction in the operation of inter-related systems. All instruction periods shall be at such times as scheduled by the COR and shall be considered concluded only when the COR is satisfied in regard to complete and thorough coverage. The contractor shall submit a course outline with associated material to the COR for review and approval prior to scheduling training to ensure the subject

matter covers the expectations of the VA and the contractual requirements. The Department of Veterans Affairs reserves the right to request the removal of, and substitution for, any instructor who, in the opinion of the COR, does not demonstrate sufficient qualifications in accordance with requirements for instructors above.

- 1.25 GOVERNMENT-FURNISHED PROPERTY: NOT REQUIRED
- 1.26 RELOCATED EQUIPMENT, ITEMS: NOT REQUIRED
- 1.27 STORAGE SPACE FOR DEPARTMENT OF VETERANS AFFAIRS EQUIPMENT: NOT REQUIRED
- 1.28 CONSTRUCTION SIGN: NOT REQUIRED
- 1.29 SAFETY SIGN: NOT REQUIRED
- 1.30 PHOTOGRAPHIC DOCUMENTATION: NOT REQUIRED
- 1.31 FINAL ELEVATION DIGITAL IMAGES: NOT REQUIRED
- 1.32 HISTORIC PRESERVATION: NOT REQUIRED
- 1.33 VA TRIRIGA CPMS: NOT REQUIRED

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SECTION 01 32 16.15
PROJECT SCHEDULES

PART 1- GENERAL

1.1 DESCRIPTION:

- A. The Contractor shall develop a project schedule to include where applicable Critical Path items that, if delayed in approval, ordering, delivery, will adversely affect the fulfillment of the contract requirements (Project Schedule), and shall keep the Project Schedule up-to-date in accordance with the requirements of this section and shall utilize the plan for scheduling, coordinating and monitoring work under this contract (including all activities of subcontractors, equipment vendors and suppliers). If appropriate, and/or required by the COR, a Conventional Critical Path Method (CPM) technique shall be utilized to satisfy both time and cost applications.
- B. Schedules called for these specifications and/or shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. Specifically, the Contractor's construction schedule shall include for each activity the anticipated dates for submitting shop drawings, submittals, samples, their review time, and the anticipated date that the Contractor is expecting such items to be reviewed and returned. If, in the estimation of the COR and Architect-Engineer, the review of shop drawings, submittals, and samples is unreasonable in time and/or quantity, based upon the actual construction activity, the Contractor will adjust the project schedule accordingly. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The COR and Architect- Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

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 (COTR).
- 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 specification section.

- C. The Contractor's representative shall have the option of developing the project schedule within their organization or to engage the services of an outside consultant. If an outside scheduling consultant is utilized, Section 1.3 of this specification will apply.

1.3 CONTRACTOR'S CONSULTANT:

- A. The Contractor shall submit a qualification proposal to the COR, within 10 days of bid acceptance. The qualification proposal shall include:
1. The name and address of the proposed consultant.
 2. Information to show that the proposed consultant has the qualifications to meet the requirements specified in the preceding paragraph.
 3. A representative sample of prior construction projects, which the proposed consultant has performed complete project scheduling services. These representative samples shall be of similar size and scope.
- B. The Contracting Officer, or the COR, has the right to approve or disapprove the proposed consultant, and will notify the Contractor of the VA decision within seven calendar days from receipt of the qualification proposal. In case of disapproval, the Contractor shall resubmit another consultant within 10 calendar days for renewed consideration. The Contractor shall have their scheduling consultant approved prior to submitting any schedule for approval.

1.4 COMPUTER PRODUCED SCHEDULES

- A. The contractor shall provide monthly, to the Department of Veterans Affairs (VA), all computer-produced time/cost schedules and reports generated from monthly project updates. This monthly computer service will include: three copies of up to five different reports (inclusive of all pages) available within the user defined reports of the scheduling software approved by the Contracting Officer; a hard copy listing of all project schedule changes, and associated data, made at the update and an electronic file of this data; and the resulting monthly updated schedule in PDM format. These must be submitted with and substantively support the contractor's monthly payment request and the signed look ahead report. The COTR shall identify the five different report formats that the contractor shall provide.

- B. The contractor shall be responsible for the correctness and timeliness of the computer-produced reports. The Contractor shall also responsible for the accurate and timely submittal of the updated project schedule and all CPM data necessary to produce the computer reports and payment request that is specified.
- C. The VA will report errors in computer-produced reports to the Contractor's representative within ten calendar days from receipt of reports. The Contractor shall reprocess the computer-produced reports and associated diskette(s), when requested by the Contracting Officer's representative, to correct errors which affect the payment and schedule for the project.

1.5 THE COMPLETE PROJECT SCHEDULE SUBMITTAL

- A. Within 45 calendar days after receipt of Notice to Proceed, the Contractor shall submit for the Contracting Officer and COR's review; three blue line copies of the interim schedule on sheets of paper 765 x 1070 mm (30 x 42 inches) and an electronic file in the previously approved CPM schedule program. The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost. Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, activity/event description, submittal schedule, duration, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start or start-to-start without lead or lag constraints. Activity/event date constraints, not required by the contract, will not be accepted unless submitted to and approved by the Contracting Officer. The contractor shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the network diagram. The Contracting Officer's separate approval of the Project Schedule shall not excuse the contractor of this requirement. Logic events (non-work) will be permitted where necessary to reflect proper logic among work events, but must have zero duration. The complete working schedule shall reflect the Contractor's approach to scheduling the complete project.

The final Project Schedule in its original form shall contain no contract changes or delays which may have been incurred during the final network diagram development period and shall reflect the entire contract duration as defined in the bid documents. These

changes/delays shall be entered at the first update after the final Project Schedule has been approved. The Contractor should provide their requests for time and supporting time extension analysis for contract time as a result of contract changes/delays, after this update, and in accordance with Article, ADJUSTMENT OF CONTRACT COMPLETION.

- B. Within 30 calendar days after receipt of the complete project interim Project Schedule and the complete final Project Schedule, the Contracting Officer or his representative, will do one or both of the following:
1. Notify the Contractor concerning his actions, opinions, and objections.
 2. A meeting with the Contractor at or near the job site for joint review, correction or adjustment of the proposed plan will be scheduled if required. Within 14 calendar days after the joint review, the Contractor shall revise and shall submit three blue line copies of the revised Project Schedule, three copies of the revised computer-produced activity/event ID schedule and a revised electronic file as specified by the Contracting Officer. The revised submission will be reviewed by the Contracting Officer and, if found to be as previously agreed upon, will be approved.
- C. The approved baseline schedule and the computer-produced schedule(s) generated there from shall constitute the approved baseline schedule until subsequently revised in accordance with the requirements of this section.

1.6 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 (including alternates) shall equal the total contract price. Prorate overhead, profit and General Requirements on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically

the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

- B. The Contractor shall cost load work activities/events for test, balance and adjust various systems in accordance with the provisions in Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS).
- C. In accordance with FAR 52.236 - 1 (PERFORMANCE OF WORK BY THE CONTRACTOR) and VAAR 852.236 - 72 (PERFORMANCE OF WORK BY THE CONTRACTOR), the Contractor shall submit, simultaneously with the cost per work activity/event of the construction schedule required by this Section, a responsibility code for all activities/events of the project for which the Contractor's forces will perform the work.
- D. The Contractor shall cost load work activities/events for all BID ITEMS including LEAD-BASED PAINT REMOVAL. The sum of each BID ITEM work shall equal the value of the bid item in the Contractors' bid.

1.7 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 as:
 - a. Contractor's time required for submittal of shop drawings, templates, fabrication, delivery and similar pre-construction work.
 - b. COR's and Architect-Engineer's review and approval of shop drawings, equipment schedules, samples, template, or similar items.
 - c. Interruption of VA Facilities utilities.
 - e. VA inspection and acceptance activity/event with a minimum duration of five work days at the end of each phase and immediately preceding any VA move activity/event required by the contract phasing for that phase.

2. Show not only the activities/events for actual construction work for each trade category of the project.
 3. Break up the work into activities/events of a duration no longer than 20 work days each or one reporting period, except as to non-construction activities/events (i.e., procurement of materials, delivery of equipment) and any other activities/events for which the COR 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 20 work days.
 4. Describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be allowed. Lead and lag time activities will not be acceptable.
 5. The schedule shall be generally numbered in such a way to reflect either discipline or phase of the work.
- B. The Contractor shall submit the following supporting data in addition to the project schedule:
1. The appropriate project calendar including working days and holidays.
 2. The planned number of shifts per day.
 3. The number of hours per shift.
- Failure of the Contractor to include this data shall delay the review of the submittal until the Contracting Officer is in receipt of the missing data.
- 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 COR. 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 COTR's approval of the Project Schedule.
- D. Compact Disk Requirements and CPM Activity/Event Record Specifications: Submit to the VA an electronic file(s) containing one file of the data required to produce a schedule, reflecting all the activities/events of the complete project schedule being submitted.

1.8 PAYMENT TO THE CONTRACTOR:

- A. Monthly, the contractor shall submit an application and certificate for payment using VA Form 10-6001a or the AIA application and certificate for payment documents G702 & G703 reflecting updated schedule activities and cost data in accordance with the provisions of the following Article, PAYMENT AND PROGRESS REPORTING, as the basis upon which progress payments will be made pursuant to Article, FAR 52.232 - 5 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS) and VAAR 852.236 - 83 (PAYMENT UNDER FIXED-PRICE CONSTRUCTION CONTRACTS). The Contractor shall be entitled to a monthly progress payment upon approval of estimates as determined from the currently approved updated project schedule. Monthly payment requests shall include: a listing of all agreed upon project schedule changes and associated data; and an electronic file (s) of the resulting monthly updated schedule.
- B. Approval of the Contractor's monthly Application for Payment shall be contingent, among other factors, on the submittal of a satisfactory monthly update of the project schedule.

1.9 PAYMENT AND PROGRESS REPORTING

- A. Monthly schedule update meetings will be held on dates mutually agreed to by the COTR and the Contractor. Contractor and their CPM consultant (if applicable) 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 COTR three work days in advance of the schedule update meeting. Job progress will be reviewed to verify:
1. Actual start and/or finish dates for updated/completed activities/events.
 2. Remaining duration for each activity/event started, or scheduled to start, but not completed.
 3. Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the Project Schedule.
 4. Changes in activity/event sequence and/or duration which have been made, pursuant to the provisions of following Article, ADJUSTMENT OF CONTRACT COMPLETION.
 5. Completion percentage for all completed and partially completed activities/events.

6. Logic and duration revisions required by this section of the specifications.
 7. Activity/event duration and percent complete shall be updated independently.
- B. After completion of the joint review, the contractor shall generate an updated computer-produced calendar-dated schedule and supply the Contracting Officer's representative with reports in accordance with the Article, COMPUTER PRODUCED SCHEDULES, specified.
- C. After completing the monthly schedule update, the contractor's representative or scheduling consultant shall rerun all current period contract change(s) against the prior approved monthly project schedule. The analysis shall only include original workday durations and schedule logic agreed upon by the contractor and resident engineer for the contract change(s). When there is a disagreement on logic and/or durations, the Contractor shall use the schedule logic and/or durations provided and approved by the resident engineer. After each rerun update, the resulting electronic project schedule data file shall be appropriately identified and submitted to the VA in accordance to the requirements listed in articles 1.4 and 1.7. This electronic submission is separate from the regular monthly project schedule update requirements and shall be submitted to the resident engineer within fourteen (14) calendar days of completing the regular schedule update. **Before inserting the contract changes durations, care must be taken to ensure that only the original durations will be used for the analysis, not the reported durations after progress. In addition, once the final network diagram is approved, the contractor must recreate all manual progress payment updates on this approved network diagram and associated reruns for contract changes in each of these update periods as outlined above for regular update periods. This will require detailed record keeping for each of the manual progress payment updates.**
- D. Following approval of the schedule, the COR, the General Contractor, and any appropriate subcontractors shall meet monthly to discuss the updated schedule. The main emphasis shall be to address work activities to avoid slippage of project schedule and to identify any necessary actions required to maintain project schedule during the reporting

period. The meeting should conclude with a clear understanding of those work and administrative actions necessary to maintain project schedule status during the reporting period. This schedule coordination meeting will occur after each monthly project schedule update meeting utilizing the resulting schedule reports from that schedule update. If the project is behind schedule, discussions should include ways to prevent further slippage as well as ways to improve the project schedule status, when appropriate.

1.10 RESPONSIBILITY FOR COMPLETION

- A. If it becomes apparent from the current revised monthly progress schedule that phasing or contract completion dates will not be met, the Contractor 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.
- B. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the COTR for the proposed schedule changes. If such actions are approved, the representative schedule revisions shall be incorporated by the Contractor into the Project Schedule before the next update, at no additional cost to the Government.

1.11 CHANGES TO THE SCHEDULE

- A. Within 30 calendar days after VA acceptance and approval of any updated project schedule, the Contractor shall submit a revised electronic file (s) and a list of any activity/event changes including predecessors and successors for any of the following reasons:
 - 1. Delay in completion of any activity/event or group of activities/events, which may be involved with contract changes, strikes, unusual weather, and other delays will not relieve the Contractor from the requirements specified unless the conditions are

shown on the CPM as the direct cause for delaying the project beyond the acceptable limits.

2. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.
 3. The schedule does not represent the actual prosecution and progress of the project.
 4. When there is, or has been, a substantial revision to the activity/event costs regardless of the cause for these revisions.
- B. Contract Schedule revisions made under this paragraph which affect the previously approved computer-produced schedules for draining the water tank by the VA Facility, contract phase(s) and sub phase(s), utilities furnished by the Government to the Contractor, or any other previously contracted item, shall be furnished in writing to the Contracting Officer for approval.
- C. COR's approval for the revised project schedule and all relevant data is contingent upon compliance with all other paragraphs of this section and any other previous agreements by the COR.
- D. The cost of revisions to the project schedule resulting from contract changes will be included in the proposal for changes in work as specified in FAR 52.243 - 4 (Changes) and VAAR 852.236 - 88 (Changes - Supplemental), and will be based on the complexity of the revision or contract change, man hours expended in analyzing the change, and the total cost of the change.
- E. The cost of revisions to the Project Schedule not resulting from contract changes is the responsibility of the Contractor.

1.12 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, CPM data and supporting evidence as the COTR may deem 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 obligatory to 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 determination as to the total number of days of contract extension will be based upon the current computer-produced calendar-dated schedule for the time period in question and all other relevant information.

- B. Actual delays in activities/events which, according to the computer- produced calendar-dated schedule, do not affect the extended and predicted contract completion dates shown by the critical path in the network, will not be the basis for a change to the contract completion date. The Contracting Officer will within a reasonable time after receipt of such justification and supporting evidence, review the facts and advise the Contractor in writing of the Contracting Officer'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 order proposal, a sketch showing all CPM logic revisions, duration (in work days) changes, and cost changes, for work in question and its relationship to other activities on the approved network diagram.
- D. All delays due to non-work activities/events such as RFI's, WEATHER, STRIKES, and similar non-work activities/events shall be analyzed on a month by month basis.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This specification defines the general requirements and procedures for submittals. A submittal is information submitted for VA review to establish compliance with the contract documents.
- B. Detailed submittal requirements are found in the technical sections of the contract specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective technical specifications at no additional cost to the government.
- C. Approval by the A/E not the VA COR of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

1.2 DEFINITIONS

- A. Preconstruction Submittals: Submittals which are required prior to issuing contract notice to proceed or starting construction. For example, Certificates of insurance; Surety bonds; Site-specific safety plan; Construction progress schedule; Schedule of values; Submittal register; List of proposed subcontractors.
- B. Shop Drawings: Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be integrated and coordinated.
- C. Product Data: Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions, and brochures, which describe and illustrate size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work. Samples

of warranty language when the contract requires extended product warranties.

- D. Samples: Physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed to establish standards by which the ensuing work can be judged.
- E. Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.
- F. Test Reports: Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- G. Certificates: Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor. The purpose is to document procedures, acceptability of methods, or personnel qualifications for a portion of the work.
- H. Manufacturer's Instructions: Pre-printed material describing installation of a product, system, or material, including special notices and MSDS concerning impedances, hazards, and safety precautions.
- I. Manufacturer's Field Reports: Documentation of the testing and verification actions taken by manufacturer's representative at the job site on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must indicate whether the material, product, or system has passed or failed the test.
- J. Operation and Maintenance Data: Manufacturer data that is required to operate, maintain, troubleshoot, and repair equipment, including manufacturer's help, parts list, and product line documentation. This data shall be incorporated in an operations and maintenance manual.

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

1.3 SUBMITTAL REGISTER

- A. The submittal register will list items of equipment and materials for which submittals are required by the specifications. This list may not be all inclusive and additional submittals may be required by the specifications. The Contractor is not relieved from supplying submittals required by the contract documents but which have been omitted from the submittal register.
- B. The submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period.
- C. The VA will provide the initial submittal register in electronic format. Thereafter, the Contractor shall track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the VA.
- D. The Contractor shall update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance of all work by Contracting Officer.
- E. The Contractor shall submit formal monthly updates to the submittal register in electronic format. Each monthly update shall document actual submission and approval dates for each submittal.

1.4 SUBMITTAL SCHEDULING

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

- D. All submittals are required to be approved prior to the start of the specified work activity.

1.5 SUBMITTAL PREPARATION

- A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
- C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
- D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
- E. Provide a transmittal form for each submittal with the following information:
 - 1. Project title, location and number.
 - 2. Construction contract number.
 - 3. Date of the drawings and revisions.
 - 4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
 - 5. List paragraph number of the specification section and sheet number of the contract drawings by which the submittal is required.
 - 6. When a resubmission, add alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
 - 7. Product identification and location in project.
- F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting for VA review. Proposed deviations from the contract

requirements are to be clearly identified. All deviations submitted must include a side by side comparison of item being proposed against item specified. Failure to point out deviations will result in the VA requiring removal and replacement of such work at the Contractor's expense.

G. Stamp, sign, and date each submittal transmittal form indicating action taken.

H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

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

1.6 SUBMITTAL FORMAT AND TRANSMISSION

- A. Provide submittals in electronic format, with the exception of material samples. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer.
- B. Compile the electronic submittal file as a single, complete document. Name the electronic submittal file specifically according to its contents.
- C. Electronic files must be of sufficient quality that all information is legible. Generate PDF files from original documents so that the text included in the PDF file is both searchable and can be copied. If documents are scanned, Optical Character Resolution (OCR) routines are required.

1.7 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Internet-based submittal service shall be used for transmittal of all submittals, request for information (RFI), progress documentation, contract modification documents (e.g. change proposals, change orders), certified payrolls, daily reports, test reports, and any other document the COR wishes to make part of the project record.
 - 2. Contractor and Architect are required to use this service.
 - 3. It is Contractor's responsibility to submit documents in PDF format.
 - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 - 5. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.

6. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid for by the Contractor. Contractor shall include the cost of the service in the contract price.
- C. Ownership: Set up ownership of the electronic submittal service account such that the Government is the sole owner and has full rights to the account. Coordinate with the Contracting Officer Representative to fulfill this requirement.
- D. Submittal Service: The selected service is:
1. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com.
- E. Training: Selected service shall include web-based training sessions for Government, Contractor, and AE personnel.
- F. Project Closeout: The Government shall determine when to terminate the service for the project. Selected internet based service shall provide archived copies of all files to the Government as part of closeout.

1.8 SAMPLES

- A. Submit two sets of physical samples showing range of variation, for each required item.
- B. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified.
- C. When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.
- D. Before submitting samples, the Contractor is to ensure that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

- E. The VA reserves the right to disapprove any material or equipment which previously has proven unsatisfactory in service.
- F. Physical samples supplied maybe requested back for use in the project after reviewed and approved.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.
- B. In the event the Contractor fails to deliver O&M Data within the time limits specified, the Contracting Officer may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.10 TEST REPORTS

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

1.11 VA REVIEW OF SUBMITTALS AND RFIS

- A. The VA will review all submittals for compliance with the technical requirements of the contract documents. The Architect-Engineer for this project will assist the VA in reviewing all submittals and determining contractual compliance. Review will be only for conformance with the applicable codes, standards and contract requirements.
- B. Period of review for submittals begins when the VA COR receives submittal from the Contractor.
- C. Period of review for each resubmittal is the same as for initial submittal.
- D. VA review period is 15 working days for submittals.
- E. VA review period is 10 working days for RFIs.
- F. The VA will return submittals to the Contractor with the following notations:
 - 1. "Approved": authorizes the Contractor to proceed with the work covered.

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

1.12 APPROVED SUBMITTALS

- A. The VA approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.
- B. VA approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.
- C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.
- D. Retain a copy of all approved submittals at project site, including approved samples.

1.13 WITHHOLDING OF PAYMENT

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

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SECTION 01 35 26
SAFETY REQUIREMENTS

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SECTION 01 35 26
Safety REQUIREMENTS

1.1 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):

E84-2013.....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 - current edition):

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-2012Standard 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 ManualComprehensive Accreditation and Certification
Manual

G. U.S. Nuclear Regulatory Commission

10 CFR 20Standards for Protection Against Radiation

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

29 CFR 1904Reporting and Recording Injuries & Illnesses

29 CFR 1910Safety and Health Regulations for General
Industry

29 CFR 1926Safety and Health Regulations for Construction
Industry

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

I. VHA Directive 2005-007

1.2 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 through 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.

1.3 REGULATORY REQUIREMENTS:

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

1.4 ACCIDENT PREVENTION PLAN (APP) :

- A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Government considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out.
- B. The APP shall be prepared as follows:
1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A10.33). Specifically articulating the safety requirements found within these VA contract safety specifications.
 2. Address both the Prime Contractors and the subcontractors work operations.
 3. State measures to be taken to control hazards associated with materials, services, or equipment provided by suppliers.
 4. Address all the elements/sub-elements and in order as follows:
 - a. **SIGNATURE SHEET.** Title, signature, and phone number of the following:
 - 1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);
 - 2) Plan approver (company/corporate officers authorized to obligate the company);

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

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

- 1) Contractor;
- 2) Contract number;
- 3) Project name;
- 4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).

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

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

- 1) A statement of the employer's ultimate responsibility for the implementation of his SOH program;
- 2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.
- 3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.;
- 4) Requirements that no work shall be performed unless a designated competent person is present on the job site;
- 5) Requirements for pre-task Activity Hazard Analysis (AHAs);

- 6) Lines of authority;
 - 7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;
- e. SUBCONTRACTORS AND SUPPLIERS.** If applicable, provide procedures for coordinating SOH activities with other employers on the job site:
- 1) Identification of subcontractors and suppliers (if known);
 - 2) Safety responsibilities of subcontractors and suppliers.
- f. TRAINING.**
- 1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.
 - 2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA 70E (current edition), machine/equipment lockout, confined space, etc...) and any requirements for periodic retraining/recertification are required.
 - 3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.
 - 4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs)
- g. SAFETY AND HEALTH INSPECTIONS.**
- 1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when

inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.

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

h. ACCIDENT 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 COR:

- 1) Exposure data (man-hours worked);
- 2) 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:

- 1) Emergency response ;
- 2) Contingency for severe weather;
- 3) Fire Prevention ;
- 4) Medical Support;
- 5) Posting of emergency telephone numbers;
- 6) Prevention of alcohol and drug abuse;
- 7) Not Used
- 8) Not Used
- 9) Hazard communication program;
- 10) Welding/Cutting "Hot" work ;
- 11) Not Used

- 12) General Electrical Safety
- 13) Not Used
- 14) Site-Specific Fall Protection & Prevention;
- 15) Not Used
- 16) Not Used
- 17) Lead abatement;
- 18) Crane Critical lift;
- 19) Respiratory protection;
- 20) Health hazard control program;
- 21) Not Used
- 22) Abrasive Blasting
- 23) Heat/Cold Stress Monitoring
- 24) Not Used
- 25) Demolition plan (to include engineering survey);
- 26) Not Used
- 27) Not Used

- C. Submit the APP to the COR 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 COR, 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 COR. 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.

1.5 ACTIVITY HAZARD ANALYSES (AHAS) :

- A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA (Example electronic AHA forms can be found on the US Army Corps of Engineers web site)
- B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.
- C. Work shall not begin until the AHA for the work activity has been accepted by the COR and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Government on-site representatives at preparatory and initial control phase meetings.
 - 1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Government Designated Authority (GDA) for acceptance prior to the start of that work activity.
 - 2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

- a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.
 - b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.
3. Submit AHAs to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES for review at least 15 calendar days prior to the start of each phase. Subsequent AHAs as shall be formatted as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls.
 4. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.
 5. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and then submitted to the COR.

1.6 PRECONSTRUCTION CONFERENCE:

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

- B. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the Contracting Officer's representative 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.

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

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

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

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

1.8 TRAINING:

- A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.
- B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course within the past 5 years.
- C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.
- D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment.

- E. Submit training records associated with the above training requirements to the COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES 15 calendar days prior to the date of the preconstruction conference for acceptance.
- F. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, emergency procedures, accident reporting etc... Documentation shall be provided to the Resident Engineer that individuals have undergone contractor's safety briefing.
- G. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.9 INSPECTIONS:

- A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to COR.
- 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 COR 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 COR within one week of the onsite inspection.

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

- A. Notify the COR 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 COR 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 COR within 5 calendar days of the accident. The COR 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 COR 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 COR monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the COR 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 (current edition), Standard for Electrical Safety in the Workplace.
- B. Mandatory PPE includes:
 - 1. Hard Hats - unless written authorization is given by the COR 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 COR 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 COR.
 - 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 - NOT REQUIRED

1.13 TUBERCULOSIS SCREENING

- A. Contractor shall provide written certification that all contract employees assigned to the work site have had a pre-placement tuberculin screening within 90 days prior to assignment to the worksite and been found have negative TB screening reactions. Contractors shall be required to show documentation of negative TB screening reactions for any additional workers who are added after the 90-day requirement before they will be allowed to work on the work site. NOTE: This can be the Center for Disease Control (CDC) and Prevention and two-step

skin testing or a Food and Drug Administration (FDA)-approved blood test.

1. Contract employees manifesting positive screening reactions to the tuberculin shall be examined according to current CDC guidelines prior to working on VHA property.
2. Subsequently, if the employee is found without evidence of active (infectious) pulmonary TB, a statement documenting examination by a physician shall be on file with the employer (construction contractor), noting that the employee with a positive tuberculin screening test is without evidence of active (infectious) pulmonary TB.
3. If the employee is found with evidence of active (infectious) pulmonary TB, the employee shall require treatment with a subsequent statement to the fact on file with the employer before being allowed to return to work on VHA property.

1.14 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 COR for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. 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 (current edition).
- C. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241 (current edition). For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
- D. Not Used

E. Not Used

F. Not Used

G. Not Used

H. Not Used

I. Not Used

J. Not Used

K. Not Used

L. Not Used

M. Not Used

N. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 (current edition) and NFPA 51B (current edition). Coordinate with COR at least 24 hours in advance. Designate contractor's responsible project-site fire prevention program manager to permit hot work.

O. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COR.

P. 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.

Q. Dispose of waste and debris in accordance with NFPA 241 (current edition). Remove from buildings daily.

R. If required, submit documentation to the COR that personnel have been trained in the fire safety aspects of working in areas with impaired structural or compartmentalization features.

1.15 ELECTRICAL

A. All electrical work shall comply with NFPA 70 (NEC - current edition), NFPA 70B (current edition), NFPA 70E (current edition), 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 current edition, 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 COR 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 (current edition), and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate 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 COR.

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 COR 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.

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

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

1.17 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.
- E. Mast Climbing work platforms: When access ladders, including masts designed as ladders, exceed 20 ft (6 m) in height, positive fall protection shall be used.

1.18 EXCAVATION AND TRENCHES - NOT REQUIRED

1.19 CRANES - NOT REQUIRED

1.20 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT) - NOT REQUIRED

1.21 CONFINED SPACE ENTRY

- A. All confined space entry shall comply with 29 CFR 1910.146 except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches [1926.651(g)].
- B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the COR.

1.22 WELDING AND CUTTING

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

1.23 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.

1.24 FLOOR & WALL OPENINGS - NOT REQUIRED

- - - E N D - - -

SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

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

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

- A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to - GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.
- B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

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

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

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

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

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

AA	Aluminum Association Inc. http://www.aluminum.org
AABC	Associated Air Balance Council http://www.aabchq.com
AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
AAN	American Nursery and Landscape Association http://www.anla.org
AASHTO	American Association of State Highway and Transportation Officials http://www.aashto.org
AATCC	American Association of Textile Chemists and Colorists http://www.aatcc.org
ACGIH	American Conference of Governmental Industrial Hygienists http://www.acgih.org
ACI	American Concrete Institute http://www.aci-int.net
ACPA	American Concrete Pipe Association http://www.concrete-pipe.org
ACPPA	American Concrete Pressure Pipe Association http://www.acppa.org
ADC	Air Diffusion Council http://flexibleduct.org
AGA	American Gas Association http://www.aga.org

AGC Associated General Contractors of America
<http://www.agc.org>

AGMA American Gear Manufacturers Association, Inc.
<http://www.agma.org>

AHAM Association of Home Appliance Manufacturers
<http://www.aham.org>

AIA American Institute of Architects
<http://www.aia.org>

AISC American Institute of Steel Construction
<http://www.aisc.org>

AISI American Iron and Steel Institute
<http://www.steel.org>

AITC American Institute of Timber Construction
<http://www.aitc-glulam.org>

AMCA Air Movement and Control Association, Inc.
<http://www.amca.org>

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

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

APA The Engineered Wood Association
<http://www.apawood.org>

ARI Air-Conditioning and Refrigeration Institute
<http://www.ari.org>

ASAE American Society of Agricultural Engineers
<http://www.asae.org>

ASCE American Society of Civil Engineers
<http://www.asce.org>

ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers http://www.ashrae.org
ASME	American Society of Mechanical Engineers http://www.asme.org
ASSE	American Society of Sanitary Engineering http://www.asse-plumbing.org
ASTM	American Society for Testing and Materials http://www.astm.org
AWI	Architectural Woodwork Institute http://www.awinet.org
AWS	American Welding Society http://www.aws.org
AWWA	American Water Works Association http://www.awwa.org
BHMA	Builders Hardware Manufacturers Association http://www.buildershardware.com
BIA	Brick Institute of America http://www.bia.org
CAGI	Compressed Air and Gas Institute http://www.cagi.org
CGA	Compressed Gas Association, Inc. http://www.cganet.com
CI	The Chlorine Institute, Inc. http://www.chlorineinstitute.org
CISCA	Ceilings and Interior Systems Construction Association http://www.cisca.org
CISPI	Cast Iron Soil Pipe Institute http://www.cispi.org

CLFMI	Chain Link Fence Manufacturers Institute http://www.chainlinkinfo.org
CPMB	Concrete Plant Manufacturers Bureau http://www.cpmc.org
CRA	California Redwood Association http://www.calredwood.org
CRSI	Concrete Reinforcing Steel Institute http://www.crsi.org
CTI	Cooling Technology Institute http://www.cti.org
DHI	Door and Hardware Institute http://www.dhi.org
EGSA	Electrical Generating Systems Association http://www.egsa.org
EEI	Edison Electric Institute http://www.eei.org
EPA	Environmental Protection Agency http://www.epa.gov
ETL	ETL Testing Laboratories, Inc. http://www.etl.com
FAA	Federal Aviation Administration http://www.faa.gov
FCC	Federal Communications Commission http://www.fcc.gov
FPS	The Forest Products Society http://www.forestprod.org
GANA	Glass Association of North America http://www.cssinfo.com/info/gana.html/
FM	Factory Mutual Insurance http://www.fmglobal.com

GA	Gypsum Association http://www.gypsum.org
GSA	General Services Administration http://www.gsa.gov
HI	Hydraulic Institute http://www.pumps.org
HPVA	Hardwood Plywood & Veneer Association http://www.hpva.org
ICBO	International Conference of Building Officials http://www.icbo.org
ICEA	Insulated Cable Engineers Association Inc. http://www.icea.net
\ICAC	Institute of Clean Air Companies http://www.icac.com
IEEE	Institute of Electrical and Electronics Engineers http://www.ieee.org/
IMSA	International Municipal Signal Association http://www.imsasafety.org
IPCEA	Insulated Power Cable Engineers Association
NBMA	Metal Buildings Manufacturers Association http://www.mbma.com
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry Inc. http://www.mss-hq.com
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NAPHCC	Plumbing-Heating-Cooling Contractors Association http://www.phccweb.org.org
NBS	National Bureau of Standards See - NIST

NBBPVI National Board of Boiler and Pressure Vessel Inspectors
<http://www.nationboard.org>

NEC National Electric Code
 See - NFPA National Fire Protection Association

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

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

NHLA National Hardwood Lumber Association
<http://www.natlhardwood.org>

NIH National Institute of Health
<http://www.nih.gov>

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

NLMA Northeastern Lumber Manufacturers Association, Inc.
<http://www.nelma.org>

NPA National Particleboard Association
 18928 Premiere Court
 Gaithersburg, MD 20879
 (301) 670-0604

NSF National Sanitation Foundation
<http://www.nsf.org>

NWWDA Window and Door Manufacturers Association
<http://www.nwwda.org>

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

PCA Portland Cement Association
<http://www.portcement.org>

PCI Precast Prestressed Concrete Institute
<http://www.pci.org>

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

PEI Porcelain Enamel Institute, Inc.
<http://www.porcelainenamel.com>

PTI Post-Tensioning Institute
<http://www.post-tensioning.org>

RFCI The Resilient Floor Covering Institute
<http://www.rfci.com>

RIS Redwood Inspection Service
See - CRA

RMA Rubber Manufacturers Association, Inc.
<http://www.rma.org>

SCMA Southern Cypress Manufacturers Association
<http://www.cypressinfo.org>

SDI Steel Door Institute
<http://www.steeldoor.org>

SOI Secretary of the Interior
http://www.cr.nps.gov/local-law/arch_stnds_8_2.htm

IGMA Insulating Glass Manufacturers Alliance
<http://www.igmaonline.org>

SJI Steel Joist Institute
<http://www.steeljoist.org>

SMACNA Sheet Metal and Air-Conditioning Contractors
National Association, Inc.
<http://www.smacna.org>

SSPC The Society for Protective Coatings
<http://www.sspc.org>

STI Steel Tank Institute
<http://www.steeltank.com>

SWI Steel Window Institute
<http://www.steelwindows.com>

TCA Tile Council of America, Inc.
<http://www.tileusa.com>

TEMA Tubular Exchange Manufacturers Association
<http://www.tema.org>

TPI Truss Plate Institute, Inc.
583 D'Onofrio Drive; Suite 200
Madison, WI 53719
(608) 833-5900

UBC The Uniform Building Code
See ICBO

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

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

WCLIB West Coast Lumber Inspection Bureau
6980 SW Varns Road, P.O. Box 23145
Portland, OR 97223
(503) 639-0651

WRCLA Western Red Cedar Lumber Association
P.O. Box 120786
New Brighton, MN 55112
(612) 633-4334

WWPA Western Wood Products Association
<http://www.wwpa.org>

- - - E N D - - -

SECTION 01 45 00
QUALITY CONTROL FOR MINOR CONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES

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

1.2 SUBMITTALS

A. Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

B. SD-01 Preconstruction Submittals:

The Contractor shall submit a QC plan within 15 calendar days after receipt of Notice of Award.

1.3 INFORMATION FOR THE CONTRACTING OFFICER (CO)

A. Prior to commencing work on construction, the Contractor can obtain a single copy set of the current report forms from the CO. The report forms will consist of the Contractor Production Report, Contractor Production Report (Continuation Sheet), Contractor Quality Control (CQC) Report, CQC Report (Continuation Sheet), Preparatory Phase Checklist, Initial Phase Checklist, Rework Items List, and Testing Plan and Log.

B. Deliver the following to the CO:

1. CQC Report: Original and one copy, by 10:00 AM the next working day after each week that work is performed;
2. Contractor Production Report: Original and one copy by 10:00 AM the next working day week after each week that work is performed;
3. Preparatory Phase Checklist: Original attached to the original CQC Report and one copy attached to each copy;
4. Initial Phase Checklist: Original attached to the original CQC Report and one copy attached to each copy;
5. Field Test Reports: One copy, within two working days after the test is performed, attached to the CQC Report;
6. QC Meeting Minutes: One copy, within two working days after the meeting; and

7. QC Certifications: As required by the paragraph entitled "QC Certifications."

1.4 QC PROGRAM REQUIREMENTS

Establish and maintain a QC program as described in this section. The QC program consists of a QC Manager, a QC plan, a Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review and approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with the requirements of this contract. The QC program shall cover on-site and off-site work and shall be keyed to the work sequence. No work or testing may be performed unless the QC Manager is on the work site.

1.4.1 Preliminary Work Authorized Prior to Acceptance

The only work that is authorized to proceed prior to the acceptance of the QC plan is mobilization of storage and office trailers, temporary utilities, and surveying.

1.4.2 Acceptance

Acceptance of the QC plan is required prior to the start of construction. The CO reserves the right to require changes in the QC plan and operations as necessary, including removal of personnel, to ensure the specified quality of work. The CO reserves the right to interview any member of the QC organization at any time in order to verify the submitted qualifications.

1.4.3 Notification of Changes

Notify the CO, in writing, of any proposed change, including changes in the QC organization personnel, a minimum of seven calendar days prior to a proposed change. Proposed changes shall be subject to the acceptance by the CO.

1.5 QC ORGANIZATION

A. QC Manager

1. Duties

Provide a QC Manager at the work site to implement and manage the QC program. In addition to implementing and managing the QC program, the QC Manager may perform the duties of project superintendent. The QC Manager is required to attend the Coordination and Mutual Understanding Meeting, conduct the QC meetings, perform the three phases of control, perform submittal review and approval, ensure

testing is performed and provide QC certifications and documentation required in this contract. The QC Manager is responsible for managing and coordinating the three phases of control and documentation performed by others.

2. Qualifications

An individual with a minimum of 5 years combined experience as a superintendent, inspector, QC Manager, project manager, or construction manager on similar size and type construction contracts which included the major trades that are part of this contract.

B. Alternate QC Manager Duties and Qualifications

Designate an alternate for the QC Manager to serve in the event of the designated QC Manager's absence. The period of absence may not exceed two weeks at one time, and not more than 30 workdays during a calendar year. The qualification requirements for the Alternate QC Manager shall be the same as for the QC Manager.

1.6 QC PLAN

A. Requirements

Provide, for acceptance by the CO, a QC plan submitted in a three-ring binder that covers both on-site and off-site work and includes the following with a table of contents listing the major sections identified with tabs.

1. QC ORGANIZATION: A chart showing the QC organizational structure and its relationship to the production side of the organization.
2. NAMES AND QUALIFICATIONS: In resume format, for each person in the QC organization.
3. DUTIES, RESPONSIBILITY AND AUTHORITY OF QC PERSONAL: Of each person in the QC organization.
4. OUTSIDE ORGANIZATIONS: A listing of outside organizations such as architectural and consulting engineering firms that will be employed by the Contractor and a description of the services these firms will provide.
5. APPOINTMENT LETTERS: Letters signed by an officer of the firm appointing the QC Manager and Alternate QC Manager and stating that they are responsible for managing and implementing the QC program as described in this contract. Include in this letter the QC Manager's authority to direct the removal and replacement of non-conforming work.

6. SUBMITTAL PROCEDURES AND INITIAL SUBMITTAL REGISTER: Procedures for reviewing, approving and managing submittals. Provide the name(s) of the person(s) in the QC organization authorized to review and certify submittals prior to approval.
7. TESTING LABORATORY INFORMATION: Testing laboratory information required by the paragraphs "Accredited Laboratories" or "Testing Laboratory Requirements", as applicable.
8. TESTING PLAN AND LOG: A Testing Plan and Log that includes the tests required, referenced by the specification paragraph number requiring the test, the frequency, and the person responsible for each test.
9. PROCEDURES TO COMPLETE REWORK ITEMS: Procedures to identify, record, track and complete rework items.
10. DOCUMENTATION PROCEDURES: Use Government formats.
11. LIST OF DEFINABLE FEATURES: A Definable Feature of Work (DFOW) is a task, which is separate and distinct from other tasks, has the same control requirements and work crews. The list shall be cross-referenced to the Contractor's Construction Schedule and the specification sections. For projects requiring a Progress Chart, the list of definable features of work shall include but not be limited to all items of work on the schedule. For projects requiring a Network Analysis Schedule, the list of definable features of work shall include but not be limited to all critical path activities.
12. PROCEDURES FOR PERFORMING THREE PHASES OF CONTROL: For each DFOW provide Preparatory and Initial Phase Checklists. Each list shall include a breakdown of quality checks that will be used when performing the quality control functions, inspections, and tests required by the contract documents. The preparatory and initial phases shall be conducted with a view towards obtaining quality construction by planning ahead and identifying potential problems.
13. PERSONNEL MATRIX: Not Applicable.
14. PROCEDURES FOR COMPLETION INSPECTION: See the paragraph entitled "COMPLETION INSPECTIONS".
15. TRAINING PROCEDURES AND TRAINING LOG: Not Applicable.

1.7 COORDINATION AND MUTUAL UNDERSTANDING MEETING

During the Pre-Construction conference and prior to the start of construction, discuss the QC program required by this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including documentation, administration for on-site and off-site work, and the coordination of the Contractor's management, production and the QC personnel. At the meeting, the Contractor will be required to explain how three phases of control will be implemented for each DFOW. Contractor's personnel required to attend shall include the QC Manager, project manager, and superintendent. Minutes of the meeting will be prepared by the QC Manager and signed by both the Contractor and the CO. The Contractor shall provide a copy of the signed minutes to all attendees. Repeat the coordination and mutual understanding meeting when a new QC Manager is appointed.

1.8 QC MEETINGS

After the start of construction, the QC Manager shall conduct QC meetings once every one week at the work site with the superintendent and the foreman responsible for the ongoing and upcoming work. The QC Manager shall prepare the minutes of the meeting and provide a copy to the CO within two working days after the meeting. As a minimum, the following shall be accomplished at each meeting:

1. Review the minutes of the previous meeting;
2. Review the schedule and the status of work and rework;
3. Review the status of submittals;
4. Review the work to be accomplished in the next two weeks and documentation required;
5. Resolve QC and production problems (RFIs, etc.);
6. Address items that may require revising the QC plan; and
7. Review Accident Prevention Plan (APP).

1.9 THREE PHASES OF CONTROL

The three phases of control shall adequately cover both on-site and off-site work and shall include the following for each DFOW.

A. Preparatory Phase

Notify the CO at least two work days in advance of each preparatory phase. Conduct the preparatory phase with the superintendent and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily CQC Report and in

the QC checklist. Perform the following prior to beginning work on each definable feature of work:

1. Review each paragraph of the applicable specification sections;
2. Review the contract drawings;
3. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required;
4. Review the testing plan and ensure that provisions have been made to provide the required QC testing;
5. Examine the work area to ensure that the required preliminary work has been completed;
6. Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data;
7. Review the APP and appropriate Activity Hazard Analysis (AHA) to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted; and
8. Discuss specific controls used and the construction methods and the approach that will be used to provide quality construction by planning ahead and identifying potential problems for each DFOW.

B. Initial Phase

Notify the CO at least two work days in advance of each initial phase. When construction crews are ready to start work on a DFOW, conduct the Initial Phase with the foreman responsible for that DFOW. Observe the initial segment of the work to ensure that it complies with contract requirements. Document the results of the Initial Phase in the daily CQC Report and in the QC checklist. Perform the following for each DFOW:

1. Establish the quality of workmanship required;
2. Resolve conflicts;
3. Ensure that testing is performed by the approved laboratory; and
4. Check work procedures for compliance with the APP and the appropriate AHA to ensure that applicable safety requirements are met.

C. Follow-Up Phase

Perform the following for on-going work daily, or more frequently as necessary, until the completion of each DFOW and document in the daily CQC Report and in the QC checklist:

1. Ensure the work is in compliance with contract requirements;

2. Maintain the quality of workmanship required;
3. Ensure that testing is performed by the approved laboratory;
4. Ensure that rework items are being corrected; and
5. Assure manufacturer's representatives have performed necessary inspections, if required.

D. Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same DFOW if the quality of on-going work is unacceptable, if there are changes in the applicable QC organization, if there are changes in the on-site production supervision or work crew, if work on a DFOW is resumed after substantial period of inactivity, or if other problems develop.

E. Notification of Three Phases of Control for Off-Site Work

Notify the CO at least two weeks prior to the start of the preparatory and initial phases.

1.10 SUBMITTAL REVIEW AND APPROVAL

Procedures for submission, review, and approval of submittals are described in the submittal section of the specification.

1.11 TESTING

Except as stated otherwise in the specification sections, perform sampling and testing required under this contract.

A. Accreditation Requirements

Construction materials testing laboratories must be accredited by a laboratory accreditation authority and will be required to submit a copy of the Certificate of Accreditation and Scope of Accreditation. The laboratory's scope of accreditation must include the appropriate ASTM standards (i.e.; E 329, C 1077, D 3666, D 3740, A 880, E 543) listed in the technical sections of the specifications. Laboratories engaged in Hazardous Materials Testing shall meet the requirements of OSHA and EPA. The policy applies to the specific laboratory performing the actual testing, not just the "Corporate Office."

B. Laboratory Accreditation Authorities

Laboratory Accreditation Authorities include the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology, the American Association of State Highway and Transportation Officials (AASHTO), International Accreditation Services, Inc. (IAS), U. S. Army Corps of Engineers Materials Testing Center (MTC), the American Association for Laboratory

Accreditation (A2LA), the Washington Association of Building Officials (WABO) (Approval authority for WABO is limited to projects within Washington State), and the Washington Area Council of Engineering Laboratories (WACEL) (Approval authority by WACEL is limited to projects within the NAVFAC WASH and Public Works Center Washington geographical area).

C. Capability Check

The CO retains the right to check laboratory equipment in the proposed laboratory and the laboratory technician's testing procedures, techniques, and other items pertinent to testing, for compliance with the standards set forth in this contract.

D. Test Results

Cite applicable Contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. If the item fails to conform, notify the CO immediately. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results shall be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the CO.

1.12 QC CERTIFICATIONS

A. Contractor Quality Control Report Certification

Each CQC Report shall contain the following statement: "On behalf of the Contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report."

B. Invoice Certification

Furnish a certificate to the CO with each payment request, signed by the QC Manager, attesting that as-built drawings are current and attesting that the work for which payment is requested, including stored material, is in compliance with contract requirements.

C. Completion Certification

Upon completion of work under this contract, the QC Manager shall furnish a certificate to the CO attesting that "the work has been completed, inspected, tested and is in compliance with the contract."

1.13 COMPLETION INSPECTIONS

A. Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Contract clause "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the QC Manager shall conduct an inspection of the work and develop a punch list of items which do not conform to the approved drawings and specifications. Include in the punch list any remaining items of the "Rework Items List", which were not corrected prior to the Punch-Out inspection. The punch list shall include the estimated date by which the deficiencies will be corrected. A copy of the punch list shall be provided to the CO. The QC Manager or staff shall make follow-on inspections to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final Inspection".

B. Pre-Final Inspection

The Government and QC manager will perform this inspection to verify that the facility is complete and ready to be occupied. A Government pre-final punch list may be developed as a result of this inspection. The QC Manager shall ensure that all items on this list are corrected prior to notifying the Government that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in a timely manner and shall be accomplished before the contract completion date for the work or any particular increment thereof if the project is divided into increments by separate completion dates.

C. Final Acceptance Inspection

The QC Manager, the superintendent, or other Contractor management personnel and the CO will be in attendance at this inspection. Additional Government personnel may be in attendance. The final acceptance inspection will be formally scheduled by the CO based upon results of the "Pre-Final Inspection". Notice shall be given to the CO at least 14 days prior to the final inspection. The notice shall state that all specific items previously identified to the Contractor as being

unacceptable will be complete by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the CO to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause "Inspection of Construction".

1.14 DOCUMENTATION

Maintain current and complete records of on-site and off-site QC program operations and activities. The forms identified under the paragraph "INFORMATION FOR THE CONTRACTING OFFICER (CO)" shall be used. Reports are required for each day work is performed. Account for each calendar day throughout the life of the contract. Every space on the forms must be filled in. Use N/A if nothing can be reported in one of the spaces. The superintendent and the QC Manager must prepare and sign the Contractor Production and CQC Reports, respectively. The reporting of work shall be identified by terminology consistent with the construction schedule. In the "remarks" section in this report which will contain pertinent information including directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered and a record of visitors to the work site. For each remark given, identify the Schedule Activity No. that is associated with the remark.

A. Quality Control Validation

Establish and maintain the following in a series of three ring binders. Binders shall be divided and tabbed as shown below. These binders shall be readily available to the Government's Quality Assurance Team during all business hours.

1. All completed Preparatory and Initial Phase Checklists, arranged by specification section.
2. All milestone inspections, arranged by Activity/Event Number.
3. A current up-to-date copy of the Testing and Plan Log with supporting field test reports, arranged by specification section.
4. Copies of all contract modifications, arranged in numerical order. Also include documentation that modified work was accomplished.
5. A current up-to-date copy of the Rework Items List.

6. Maintain up-to-date copies of all punch lists issued by the QC Staff on the Contractor and Sub-Contractors and all punch lists issued by the Government.

B. As-Built Drawings

The QC Manager is required to review the as-built drawings and are kept current on a daily basis and marked to show deviations, which have been made from the Contract drawings. Ensure each deviation has been identified with the appropriate modifying documentation, e.g. PC number, modification number, RFI number, etc. The QC Manager shall initial each deviation or revision. Upon completion of work, the QC Manager shall submit a certificate attesting to the accuracy of the as-built drawings prior to submission to the CO.

1.15 NOTIFICATION ON NON-COMPLIANCE

The CO will notify the Contractor of any detected non-compliance with the foregoing requirements. The Contractor shall take immediate corrective action. If the contractor fails or refuses to correct the non-compliant work, the CO will issue a non-compliance notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the CO may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall make no part of the time lost due to such stop orders the subject of claim for extension of time, for excess costs, or damages.

PART 2 PRODUCTS- Not Used

PART 3- EXECUTION- Not Used

-- End of Section --

SECTION 01 45 29.10
TESTING SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies the special testing activities and inspection services required during the improvement of the WJB Dorn VAMC water tank. It is recognized that the project requirements for the improvement of the WJB Dorn VAMC water tank are specialized and as such require specialized oversight and testing credentials during the construction period. The oversight and testing services as described herein shall be provided by the Water Tank Improvement Consultant. The Water Tank Improvement Consultant shall be retained by the General Contractor; however, the Water Tank Improvement Consultant shall act as an independent, third party inspector of the work.

1.2 REQUIREMENTS:

- A. General: The Water Tank Improvement Consultant shall be present at the site during the critical phases of the water tank Improvement process. Certain phases of the water tank improvement require inspection and testing services that can only be provided by individuals who are trained and equipped to climb and enter the water tank. It is understood that neither the WJB Dorn VAMC personnel nor the Design Team personnel are so trained and equipped.
- B. Costs: All costs, including but not limited to labor and travel, associated with the oversight, inspection, and testing services provided by the Water Tank Improvement Consultant shall be the sole responsibility of the General Contractor and shall be included in the Base Bid as identified in 01 00 00 General Requirements, paragraph 1.3 Statement of Bid Item(s).
- C. Oversight, Inspection and Testing: The Water Tank Improvement Consultant shall provide oversight of the work, inspect materials and workmanship, and perform tests described herein and any additional tests or inspections as may be necessitated by the progression of the renovation work on the WJB Dorn VAMC water tank improvement project. When it appears materials furnished, or work performed by Contractor fail to meet construction contract requirements, the Water Tank Improvement Consultant shall immediately notify the COR.

D. Written Reports: The Water Tank Improvement Consultant shall submit all inspection and test reports to the COR and the General Contractor, unless other arrangements are agreed to in writing by the COR. All reports of inspection and tests that fail to meet construction contract requirements shall be submitted to the COR both digitally and on colored paper.

E. Verbal Reports: The Water Tank Improvement Consultant is not authorized to give verbal approval to the General Contractor for any work. When non-conforming materials or workmanship are discovered, the Water Tank Improvement Consultant will notify the COR immediately of such irregularities.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 CRITICAL PHASE INSPECTIONS:

A. General: The Water Tank Improvement Consultant shall provide qualified personnel, materials, equipment, and transportation as required to perform the services identified/required herein, within the agreed to schedule and/or time frame. The work to be performed shall be as identified herein and shall include but not be limited to the following:

1. Weld Inspection:

- a) Inspect repair/installation work for specification compliance. All weld repairs are to be visually inspected for surface defects (i.e. undercut, negative reinforcement, non-fusion, etc.)

2. Wet Interior - Painting:

- a) Set the standard for interior abrasive cleaning and examine surface profile created.
- b) Inspect interior abrasive blast cleaning for thoroughness, surface profile, and compliance with the specifications, prior to application of the succeeding paint coat.
- c) Inspect the interior primer coat for uniformity, coverage, and dry fil thickness, prior to application of the succeeding paint coat.

- d) Inspect the interior intermediate coating uniformity, coverage, dry film thickness, and holiday detection, prior to application of the succeeding paint coat.
- e) Inspect the interior stripe coat for uniformity, coverage, and thoroughness.
- f) Inspect the interior topcoat for uniformity, coverage, performance, and dry film thickness for compliance with the specifications. Examine the overall project for possible damage caused by equipment removal. Inspect the application of top coats/installation of screens, light bulbs, etc.
- g) Inspect application of seam sealer to roof lap seams of the interior.

3. Exterior - Painting:

- a. Inspect exterior high pressure water cleaning for thoroughness and compliance with the specifications, and set a standard for spot tool cleaning (SP-11) or abrasive blast cleaning.
- b. Inspect exterior abrasive blast cleaning for thoroughness, surface profile, and compliance with the specifications. The exterior binder coat will be inspected for uniformity, coverage, and dry film thickness prior to application of the succeeding paint coat.
- c. Inspect the exterior prime coating for uniformity, coverage, and dry film thickness prior to application of the succeeding paint coat.
- d. Inspect the exterior intermediate epoxy coating for uniformity, coverage, and dry film thickness prior to application of the succeeding paint coat.
- e. Inspect the exterior intermediate urethane coating for uniformity, coverage, and dry film thickness prior to application of the succeeding paint coat.
- f. Inspect the exterior topcoat for uniformity, coverage, performance, and dry film thickness for compliance with the specifications. Examine the overall project for possible damage caused by equipment removal. Inspect the application of top coats/installation of screens, light bulbs, etc.

- g. Inspect the application of the lettering/logo to the exterior for thoroughness, location, and aesthetic appearance in accordance with the specification requirements.

4. Pit Piping - Painting:

- a. Inspect the abrasive blast cleaning of the pit piping, examine surface profile, and cleanliness for compliance with the specifications.
- b. Inspect the pit piping primer coat for uniformity, coverage, and dry film thickness, prior to the application of the succeeding paint coat.
- c. Inspect the interior stripe coat for uniformity, coverage, and thoroughness.
- d. Inspect the pit piping topcoat for uniformity, coverage, performance, and dry film thickness for compliance with the specifications. Examine the overall project for possible damage caused by equipment removal. Review all contract items to assure they have been completed according to the contract requirements.

5. Project Finalization:

- a. Concurrent with other inspection, formulate a punch list of items to complete.
- b. Finalize the project to assure all items in the contract specifications have been completed, and the quality of workmanship meets the contract requirements.

B. Cathodic Protection Inspections:

- 1. Inspect the cathodic protection repair/installation work for compliance with the specification requirements.
- 2. After installation of the cathodic protection system, inspect the set-up and operation for compliance with the specification requirements.

C. Inspection Services:

- 1. Review the experience/training credentials of the contractor's crew and the equipment to be used for compliance with the specification requirements and the ability of the contractor to meet the time constraints of the project schedule.
- 2. Review abrasive and coating materials for approved manufacturers.

3. Inspect compressed air at blast nozzle for cleanliness (i.e. oil, moisture).
4. Measure surface profile created by abrasive blast cleaning by compressive tape or surface comparator.
5. Inspect abrasive blast cleanliness for compliance with the specification requirements using SSPC Visual Standards, latest edition.
6. Review coating mixing, thinning, and manufacturer's application requirements.
7. Monitor environmental conditions prior to and during coating application (i.e. ambient temperature, surface temperature, relative humidity, and dew point).
8. Inspect applied coating for dry film thickness, coverage, uniformity, and cure.
9. Collect appropriate samples for pre-disposal laboratory testing.
10. Prepare daily inspection report detailing above referenced items and contractor's daily progress.

D. Warranty Inspection (ROV):

1. Inspect the water tank's interior coating for compliance with the specification's warranty requirements.
2. Review all interior surfaces for corrosion and/or damage, and qualify damage for repairs. All repairs are to be quantified by extrapolation of a measured area and compared to the specification warranty requirements.
3. Inspect the exterior coating.
4. Review all exterior appurtenances for damage due to corrosion.
5. Review exterior of the exposed foundations.
6. Review all health aspects of the tank, including screening of the vent, overflow pipe, and other possible contamination sources.
7. Prepare a report documenting all items found that meet or fail to meet the specification warranty requirements and recommendations for repair.

E. Warranty Inspection Items to be completed by the WJB Dorn VAMC prior to the Warranty Inspection services identified in paragraph D above:

1. Fill the water tank to overflow or higher capacity, and isolate the water tank for the WJB Dorn VAMC water supply system during the ROV

inspection. If the preceding is not possible, maintain positive flow with no water withdrawal from the tank.

2. Perform free chlorine residual and bacteriological testing after completion of the ROV inspection.

3.2 WATER TANK IMPROVEMENT CONSULTANT:

The basis for all Oversight, Inspection, and Testing services noted in this section is Dixon Engineering, Inc., 1104 Third Avenue, Lake Odessa, MI, 48849, phone: 616-374-3221.

SECTION 01 53 43
PROTECTION OF THE ENVIRONMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor in executing work shall maintain work areas on-and-off site free from environmental pollution that would be in violation of federal, state, or local regulations.

1.2 RELATED REQUIREMENTS

A. 01 00 00 GENERAL REQUIREMENTS

B. 01 35 26 SAFETY REQUIREMENTS

1.3 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.4 PROTECTION of SEWERS

A. During the execution of the work the contractor shall prevent impairment of operation of existing sanitary and storm sewer systems. Prevent construction material, pavement, concrete, earth, or other debris from entering sewer or sewer structure.

1.5 PROTECTION of WATERWAYS

- A. Observe rules and regulations of local and state agencies, and agencies of U.S. government prohibiting pollution of any lake, stream, river, or wetland by dumping of refuse, rubbish, dredge material, or debris therein.
- B. Provide containment that will divert flows, including storm flows and flows created by construction activity, to prevent loss of residues and excessive silting of waterways or flooding damage to property.
- C. Comply with procedures outlined in U.S. EPA manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation," Manual EPA-72-015 and "Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity," Manual EPA 43019-73-007.

1.6 DISPOSAL of EXCESS EXCAVATED and OTHER WASTE MATERIALS

- A. Dispose waste material in accordance with federal and state codes, and local zoning ordinances.
- B. Unacceptable disposal sites include, but are not limited to, sites within wetland or critical habitat, and sites where disposal will have detrimental effect on surface water or groundwater quality.
- C. Make arrangements for disposal subject to submission of proof to engineer that owner(s) of proposed site(s) has valid fill permit issued by appropriate government agency and submission of haul route plan, including map of proposed route(s).
- D. Provide watertight conveyance for liquid, semi-liquid, or saturated solids not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.
- E. Waste generated by abrasive blast cleaning is detailed in Section 09 97 13.

1.7 PROTECTION of AIR QUALITY

- A. Contain paint aerosols and VOCs by acceptable work practices.
- B. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment used by contractor, and encouraging shutdown of motorized equipment not actually in use.
- C. Trash burning not permitted on VAMC property.
- D. If temporary heating devices are necessary for protection of work, they shall not cause air pollution.

1.8 PROTECTION from FUEL and SOLVENTS

- A. Submit to the COR and Architect all plans and photos, or drawings of all containment structures, planned paint storage procedures, planned paint mixing (as it relates to possible spillage), and paint waste disposal.
- B. All required material must be submitted to the COR and Architect prior to the pre-construction meeting. No equipment may be delivered to the site without approval of submittals.
- C. The owner reserves the right to restrict equipment location.
- D. Protect the ground from spills of fuel, oils, petroleum distillates, or solvents by use of containment systems.

1. Total paint, thinner, oils, and fuel delivered to and stored on-site cannot exceed supplied capacity of spill containment provided (i.e. fuel in compressor must have secondary containment to catch both fuel and oil to be sized to exceed possible spill.
 2. Do not leave nozzle while fueling.
 3. Provide a different containment unit under fuel tank and oil reservoirs for all equipment and fuel storage tanks.
 4. Barrels of solvents, even for cleaning, are prohibited. Do not deliver paint thinners in containers greater than five (5) gallons.
- E. Disposal of waste fluids shall be in conformance with federal, state, and local laws and regulations.

1.9 USE of CHEMICALS

- A. Chemicals used during project construction or furnished for project operations, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification must show approval of U.S. EPA, U.S. Department of Agriculture, state, or other applicable regulatory agency.
- B. Use of such chemicals and disposal of residues shall be in conformance with manufacturer's written instructions and applicable regulatory requirements.

1.10 NOISE CONTROL

- A. Conduct operations to cause least annoyance to residents in vicinity of work, and comply with applicable local ordinances.
- B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.
- C. Equip gasoline or oil operated equipment with silencers or mufflers on intake and exhaust lines.
- D. Route vehicles carrying materials over such streets as will cause least annoyance to public and do not operate on public streets between hours of 6:00 p.m. and 7:00 a.m., or on Saturdays, Sundays, or legal holidays unless approved by owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 HAZARDOUS MATERIALS PROJECT PROCEDURES

A. Applicable Regulations:

1. RCRA, 1976 - Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage, and disposal of hazardous waste nationally.

B. To use an off-site hazardous waste disposal facility, the contractor must use the Uniform Hazardous Waste Manifest (shipping paper).

C. Federal, state, and local laws and regulations may apply to the storage, handling, and disposal of hazardous materials and waste.

- - END - -

SECTION 01 57 19
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.1 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.

1.2 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.

1.3 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

1.4 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 Resident Engineer 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 COR 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 material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
 - 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.

1.5 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, top soil, and land forms without permission from the Resident Engineer. 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. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment. Transport all solid waste off Government property and dispose of waste in compliance with Federal, State, and local requirements.
 4. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
 5. Handle discarded materials other than those included in the solid waste category as directed by the COR.
- 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.
 3. Monitor water areas affected by construction.

- 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 South Carolina Code of Laws, Title 48 - Environmental Protection /and Conservation. 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. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.
- 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 Resident Engineer. 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

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.
- B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.
- C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
 - 1. Waste Management Plan development and implementation.
 - 2. Techniques to minimize waste generation.
 - 3. Sorting and separating of waste materials.
 - 4. Salvage of existing materials and items for reuse or resale.
 - 5. Recycling of materials that cannot be reused or sold.
- D. At a minimum the following waste categories shall be diverted from landfills:
 - 1. Soil.
 - 2. Inerts (eg, concrete, masonry and asphalt).
 - 3. Clean dimensional wood and palette wood.
 - 4. Green waste (biodegradable landscaping materials).
 - 5. Engineered wood products (plywood, particle board and I-joists, etc).
 - 6. Metal products (eg, steel, wire, beverage containers, copper, etc).
 - 7. Cardboard, paper and packaging.
 - 8. Bitumen roofing materials.
 - 9. Plastics (eg, ABS, PVC).
 - 10. Carpet and/or pad.
 - 11. Gypsum board.
 - 12. Insulation.
 - 13. Paint.
 - 14. Fluorescent lamps.

1.2 RELATED WORK

- A. Section 02 41 00, DEMOLITION.
- B. Section 01 00 00, GENERAL REQUIREMENTS.
- C. Lead Paint: Section 09 97 13.21, LEAD/CHROME BASED PAINT REMOVAL AND DISPOSAL.
- D. Section 09 97 13.11.01, CONTAINMENT FLEXIBLE FRAME SYSTEM

1.3 QUALITY ASSURANCE

- A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
 - 1. Excess or unusable construction materials.
 - 2. Packaging used for construction products.
 - 3. Poor planning and/or layout.
 - 4. Construction error.
 - 5. Over ordering.
 - 6. Weather damage.
 - 7. Contamination.
 - 8. Mishandling.
 - 9. Breakage.
- B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.
- C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50 percent.
- D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.
- E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website <http://www.wbdg.org/tools/cwm.php> provides a Construction Waste Management Database that contains

information on companies that haul, collect, and process recyclable debris from construction projects.

- F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.
- G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.
- H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.
- B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.
- C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.
- D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.
- E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

- I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.
- J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.
- K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.
- L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
 - 1. On-site Recycling - Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
 - 2. Off-site Recycling - Materials hauled to a location and used in an altered form in the manufacture of new products.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.
- N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.
- O. Return: To give back reusable items or unused products to vendors for credit.
- P. Salvage: To remove waste materials from the site for resale or re-use by a third party.
- Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.
- R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto

other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES, furnish the following:
- B. Prepare and submit to the COR a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
 - 1. Procedures to be used for debris management.
 - 2. Techniques to be used to minimize waste generation.
 - 3. Analysis of the estimated job site waste to be generated:
 - a. List of each material and quantity to be salvaged, reused, recycled.
 - b. List of each material and quantity proposed to be taken to a landfill.
 - 4. Detailed description of the Means/Methods to be used for material handling.
 - a. On site: Material separation, storage, protection where applicable.
 - b. Off site: Transportation means and destination. Include list of materials.
 - 1) Description of materials to be site-separated and self-hauled to designated facilities.
 - 2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
 - c. The names and locations of mixed debris reuse and recycling facilities or sites.
 - d. The names and locations of trash disposal landfill facilities or sites.
 - e. Documentation that the facilities or sites are approved to receive the materials.
- C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

- D. 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.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.
- B. Not Used

1.7 RECORDS

Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. List of each material and quantity to be salvaged, recycled, reused.
- B. List of each material and quantity proposed to be taken to a landfill.
- C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

- A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.
- B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.
- C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 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 and federal regulations.

- B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

- A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.
- B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.
- C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

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SECTION 02 83 33.13
LEAD-BASED PAINT REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing and disposal of lead-based paint from exterior tank surfaces and pit piping.

1.2 RELATED REQUIREMENTS - NOT USED

1.3 DEFINITIONS

- A. Action Level: Employee exposure, without regard to use of respirator, to lead airborne concentration of 30 micrograms per cubic meter (0.03 parts per million) of air averaged over 8-hour period. As used in this section, "30 micrograms per cubic meter of air (0.03 parts per million)" refers to action level.
- B. Area Monitoring: Sampling of lead concentrations within lead control area and inside physical boundaries which are representative of airborne lead concentrations which may reach breathing zone of personnel potentially exposed to lead.
- C. Breathing Zone: Area within hemisphere, forward of shoulders, with 150 mm to 225 mm (6 to 9 inches) radius and center at nose or mouth of employee.
- D. Certified Industrial Hygienist (CIH): As used in this section, refers to an Industrial Hygienist that is certified and is employed by Contractor.
- E. Change Rooms and Shower Facilities: Rooms within designated physical boundary around lead control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross- contamination.
- F. Competent Person: Person capable of identifying lead hazards in work area and authorized by contractor to take corrective action.
- G. Decontamination Room: Room for removal of contaminated personal protective equipment (PPE).
- H. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead averaged over 8-hour workday to which an employee is exposed.

- I. High Efficiency Particulate Air (HEPA) Filter Equipment:
HEPA filtered vacuuming equipment with UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. HEPA filter means 99.97 percent efficient against 0.3 micron (0.012 mil) size particles.
- J. Industrial Hygienist (IH): As used in this section, refers to an Industrial Hygienist that works under the supervision and guidance of a CIH and is employed by Contractor.
- K. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
- L. Lead Control Area: Enclosed area or structure with full containment to prevent spreading lead dust, paint chips, and debris from lead-based paint removal operations. Lead control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
- M. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter (0.05 parts per million) of air as 8-hour time weighted average as determined by 29 CFR Part 1910.1025. When employee is exposed for more than 8 hours per work day, determine PEL by following formula.
$$\text{PEL micrograms/cubic meter (parts per million) of air} = 400/\text{No. of hrs. worked per day.}$$
- N. Personnel Monitoring: Sampling of lead concentrations within employee breathing zone to determine 8-hour time weighted average concentration according to 29 CFR Part 1910.1025. Take samples representative of employee's work tasks.
- O. Physical Boundary: Area physically roped or partitioned off around enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean same as "outside lead control area."

1.4 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. SSPC Guide-7 Disposal of Lead Contaminated Surface Preparation Debris
- C. American National Standards Institute (ANSI):
 - 1. Z9.2-12 - Fundamentals Governing the Design & Operation of Local Exhaust Ventilation Systems.
- D. Code of Federal Regulations (CFR):
 - 1. 29 CFR Part 1910 - Occupational Safety and Health Standards.

2. 29 CFR Part 1926 - Safety and Health Regulations for Construction.
 3. 40 CFR Part 260 - Hazardous Waste Management System: General.
 4. 40 CFR Part 261 - Identification and Listing of Hazardous Waste.
 5. 40 CFR Part 262 - Standards Applicable to Generators of Hazardous Waste.
 6. 40 CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste.
 7. 40 CFR Part 264 - Standards for Owners and Operations of Hazardous Waste Treatment, Storage, and Disposal Facilities.
 8. 40 CFR Part 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.
 9. 40 CFR Part 268 - Land Disposal Restrictions.
 10. 49 CFR Part 172 - Hazardous Material Table, Special Provisions, Hazardous Material Communications, Emergency Response Information, and Training Requirements, and Security Plans.
 11. 49 CFR Part 178 - Specifications for Packaging.
- E. Underwriters Laboratories (UL):
1. 586-09 - High-Efficiency, Particulate, Air Filter Units.

1.5 PRE-REMOVAL MEETINGS

- A. Conduct pre-removal meeting at project site a minimum of 30 days before beginning Work of this section.
1. Required Participants:
 - a. Contracting Officer's Representative.
 - b. Certified Industrial Hygienist.
 - c. General Contractor's Representative
 - d. Water Tank Improvement Consultant (Testing).
 - e. Paint removal subcontractor.
 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Respiratory protection program.
 - b. Hazard communication program.
 - c. Hazardous waste management plan.
 - d. Safety and health regulation compliance.
 - e. Employee training.
 - f. Removal schedule.
 - g. Removal sequence.

- h. Preparatory work.
 - i. Protection before, during, and after removal.
 - j. Removal.
 - k. Inspecting and testing.
 - l. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.6 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Site Specific Lead Health and Safety Plan, Including:
 - 1. Work procedures for each job classification
 - 2. Administration and engineering controls to be used during exposure assessment period and expected exposure.
 - 3. Personal hygiene procedures.
 - 4. Site personnel register (update as needed.)
 - 5. Qualifications of competent person(s) and responsibilities.
 - 6. 24 hour job site contact person and cell phone number.
 - 7. Site map showing ingress/egress and location of all equipment.
- C. Site Specific Lead Based Paint Abatement Plan, Including:
 - 1. Description of work practices.
 - 2. Containment methods.
 - 3. PPE.
 - 4. Exposure monitoring methods.
 - 5. Personal air sampling procedures that comply with OSHA requirements
 - if initial sampling determines negative exposure monitoring may be discontinued as described in 29CFR1926.62
- D. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - a. Paint removal products.
 - b. Vacuum filters.
 - c. Respirators.
 - 2. Safety data sheet for each paint removal product.
 - 3. Installation instructions.
 - a. Paint removal products.
- E. Test Reports: Submit testing laboratory reports.

1. Submit air monitoring results within three working days, signed by testing laboratory employee performing air monitoring, employee analyzing sample, and CIH.
- F. Certificates: Certify completed training.
 1. Submit certificate for each employee signed and dated by CIH and employee stating employee was trained.
- G. Qualifications: Substantiate qualifications comply with specifications.
 1. Paint removal contractor.
 2. Testing laboratory.
 - a. Name, address, and telephone number.
 - b. Current evidence of participation in NIOSH PAT Program.
 - c. Copy of current AIHA accreditation certificate.
 3. Industrial hygienist.
 - a. Name, address, and telephone number.
 - b. Resume showing previous experience.
 - c. Copy of current ABIH CIH certification.
 4. Paint disposal facility.
 - a. Name, address, and telephone number.
 - b. Current license or authorization to receive and dispose lead contaminated waste.
- H. Record Documents:
 1. Completed and signed hazardous waste manifest from waste transported, (if applicable)
 2. Paint disposal facility receipts and disposition reports.
 3. Certification of medical examinations.
 4. Employee training certification.

1.7 QUALITY ASSURANCE

- A. Safety and Health Regulation Compliance:
 1. Comply with laws, ordinances, rules, and regulations of federal, state, and local authorities having jurisdiction regarding removing, handling, storing, transporting, and disposing lead waste materials.
 - a. Comply with applicable requirements of 29 CFR Part 1910.1025.
 - b. Notify Contracting Officer's Representative and request resolution of conflicts between regulations and specified requirements before starting work.

2. Comply with the following local laws, ordinances, criteria, rules and regulations regarding removing, handling, storing, transporting, and disposing lead-contaminated materials:
 - a. South Carolina Hazardous Waste Management Act.
- B. Paint Removal Contractor: Experienced contractor, registered or licensed by applicable state agency regulating lead-based paint removal.
- C. Testing Laboratory: State certified independent testing laboratory experienced in airborne lead monitoring, testing, and reporting.
 1. Successful participant in NIOSH Proficiency Analytical Testing (PAT) Program within prior 12 months.
 2. Accredited by American Industrial Hygiene Association (AIHA).
- D. Certified Industrial Hygienist: Certified as CIH by American Board of Industrial Hygiene in comprehensive practice and responsible for:
 1. Certify Training.
 2. Review and approve lead-based paint removal plan for conformance to applicable referenced standards.
 3. Inspect lead-based paint removal work for conformance with approved plan.
 4. Direct monitoring.
 5. Ensure work is performed according to specifications.
 6. Ensure personnel and environment hazardous exposures are adequately controlled.
- E. Paint Disposal Facility: State certified disposal facility qualified to receive and dispose lead-based paint.
- F. Lead-based Paint Removal Plan:
 1. Submit detailed, site-specific plan describing lead-based paint removal procedures.
 2. Include sketch showing location, size, and details of lead control areas, decontamination rooms, change rooms, shower facilities, and mechanical ventilation system.
 3. Include eating, drinking, and restroom procedures, interface of trades, work sequencing, collected wastewater and paint debris disposal plan, air sampling plan, respirators, protective equipment, and detailed description of containment methods ensuring airborne

- lead concentrations do not exceed action level outside lead control area.
- a. Eating, drinking, and smoking are not acceptable within lead control area.
- 4. Include air sampling, training and strategy, sampling methodology, frequency, duration, and qualifications of air monitoring personnel.
- G. Respiratory Protection Program: Establish and implement program required by 29 CFR Part 1910.134, 29 CFR Part 1910.1025, and 29 CFR Part 1926.62.
- 1. Provide each employee negative pressure or other appropriate respirator.
 - a. Test fit each employee's respirator at initial fitting and maximum 6 month intervals, as required by 29 CFR Part 1926.62.
- H. Hazard Communication Program: Establish and implement program required by 29 CFR Part 1910.1200.
- I. Hazardous Waste Management Plan: Establish and implement plan according to applicable requirements of Federal, State, and local hazardous waste regulations including the following:
- 1. Identification of hazardous wastes associated with work.
 - 2. Estimated quantities of generated and disposed waste.
 - 3. Names and qualifications of each contractor transporting, storing, treating, and disposing wastes. Include facility location and 24-hour point of contact. Provide two copies of state hazardous waste permit applications, permits and identification numbers.
 - 4. Names and qualifications (experience and training) of personnel working on-site with hazardous wastes.
 - 5. List of required waste handling equipment including cleaning, volume reduction, and transport equipment.
 - 6. Spill prevention, containment, and cleanup contingency implementation measures.
 - 7. Work plan and schedule for waste containment, removal, and disposal with daily waste cleaned up and containerization.
 - 8. Hazardous waste disposal cost.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PAINT REMOVAL PRODUCTS

- A. Chemical Stripper: Biodegradable, non-toxic, capable of removing existing paint layers in one application, and acceptable to CIH.

2.2 ACCESSORIES

- A. Waste Collection Drums: 49 CFR Part 178; Type 1A2, steel, removable head, 200 L (55 gal.) capacity, capable of containing waste without loss.
- B. Vacuum Cleaner: HEPA filtered type.
- C. Scrapers:
 - 1. Metal type for use on metal, concrete, and masonry surfaces.
 - 2. Plastic type for use on wood, plaster, gypsum board, and other surfaces.
- D. Rinse Water: Potable.
- E. Cleaning Cloths: Cotton.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before exposure to lead-contaminated dust, provide workers with comprehensive medical examination required by 29 CFR Part 1926.62 (I) (1) (i) and (ii).
 - 1. Exemption: Examination is not required when employee medical records show last examination required by 29 CFR Part 1926.62(I) was completed within previous 12 months.
- B. Maintain complete and accurate employee medical records according to 29 CFR Part 1910.20.
- C. Train each employee performing paint removal, disposal, and air sampling operations according to 29 CFR Part 1926.62.
 - 1. Certify training is completed before employee is permitted to work on project and enter lead control area.

3.2 PREPARATION

- A. Protect existing work indicated to remain.
 - 1. Perform paint removal work without damaging and contaminating adjacent work.

2. Restore damage and contamination to original condition.
- B. Notify Contracting Officer 20 days before starting paint removal work.
- C. Lead Control Area Requirements:
 1. Establish lead control area by completely enclosing lead-based paint removal work area with a dust tight containment system.
 2. Contain removal operations using negative pressure full containment system with minimum one change room and HEPA filtered exhaust.
- D. Boundary Requirements: Provide physical boundaries around lead control area by providing curtains, portable partitions or other enclosures to ensure that airborne lead concentrations do not meet or exceed action level outside of lead control area.
- E. Decontamination facility with Change Room and Shower Facilities:
Provide clean change rooms and shower facilities within physical boundary around lead control area according to 29 CFR Part 1926.62.
- F. Mechanical Ventilation System:
 1. Provide ventilation system to control personnel exposure to lead according to 29 CFR Part 1926.57.
 2. Design, construct, install, and maintain HEPA filtered fixed local exhaust ventilation system according to ANSI Z9.2 and approved by CIH.
 3. Exhaust ventilation air to exterior wherever possible.
 4. When exhaust ventilation air must be recirculated into work area, provide HEPA filter with reliable back-up filter and controls to monitor lead concentration in return air and to bypass recirculation system automatically when system fails.
- G. Personnel Protection: Provide and use required protective clothing and equipment within lead control area.
- H. Warning Signs: Provide warning signs complying with 29 CFR Part 1926.62 at lead control area approaches. Locate signs so personnel read signs and take necessary precautions before entering lead control area.

3.3 WORK PROCEDURES

- A. Remove lead-based paint according to approved lead-based paint removal plan.
 1. Perform work only in presence of Industrial Hygienist (IH) Technician under direction of CIH ensuring continuous inspection of work in progress and direction of air monitoring activities.

2. Handle, store, transport, and dispose lead or and lead contaminated waste according to 40 CFR Part 260, 40 CFR Part 261, 40 CFR Part 262, 40 CFR Part 263, 40 CFR Part 264, and 40 CFR Part 265. Comply with land disposal restriction notification requirements as required by 40 CFR Part 268.
- B. Use procedures and equipment required to limit occupational and environmental lead exposure when lead-based paint is removed according to 29 CFR Part 1926.62.
- C. Dispose removed paint and waste according to state requirements.
- D. Personnel Exiting Procedures:
1. When personnel exit lead control area, comply with the following procedures:
 - a. Vacuum exposed clothing surfaces.
 - b. Remove protective clothing and equipment in decontamination room. Place clothing in approved impermeable disposal bag.
 - c. Shower.
 - d. Dress in clean clothes before leaving lead control area.
- E. Monitoring - General:
1. Monitor airborne lead concentrations according to 29 CFR Part 1910.1025 by testing laboratory as directed by CIH.
 2. Take personal air monitoring samples on employees anticipated to have greatest exposure risk as determined by CIH. Additionally, take air monitoring samples on minimum 25 percent of work crew or minimum of two employees, whichever is greater, during each work shift.
 3. Submit results of air monitoring samples, signed by CIH, within 24 hours after taking air samples. Notify Contracting Officer's Representative immediately of lead exposure at or exceeding action level outside of lead control area.
- F. Monitoring During Paint Removal (to be conducted by IH):
1. Perform personal and area monitoring during entire paint removal operation.
 2. Conduct area monitoring at physical boundary daily for each work shift to ensure unprotected personnel are not exposed above action level anytime.
 3. For outdoor operations, take at least one sample on each shift leeward of lead control area. When adjacent areas are contaminated,

clean area of contamination and have CIH visually inspect and certify lead contamination is cleaned.

4. Stop work when outside boundary lead levels meet or exceed action level. Notify Contracting Officer's Representative, immediately.
5. Correct conditions causing increased lead concentration as directed by CIH.
6. Review sampling data collected during work stoppage to determine if conditions require additional work method modifications as determined by CIH.
7. Resume paint removal when approved by CIH.

3.4 LEAD-BASED PAINT REMOVAL

- A. Remove paint on exterior tank surfaces.
- B. Comply with paint removal processes described in lead paint removal plan.
- C. Lead-Based Paint Removal: Select processes for each application to minimize work area lead contamination and waste.

3.5 SUBSTRATE SURFACE PREPARATION

- A. Protect substrates from deterioration and contamination until refinished.
 1. Protect metal substrates from flash rusting.
- B. Prepare and paint substrates according to Section 09 91 00, PAINTING.

3.6 FIELD QUALITY CONTROL.

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Perform sampling and testing for:
 1. Air monitoring.
 2. Lead based paint.

3.7 CLEANING AND DISPOSAL

- A. Cleaning:
 1. Maintain lead control area surfaces free of accumulating paint chips and dust. Confine dust, debris, and waste to work area.
 2. Clean work area daily, at end of each shift, and when paint removal operation is complete.

- B. CIH Certification: Certify in writing that inside and outside lead control area air monitoring samples are less than action level, employee respiratory protection was adequate, the work was performed according to 29 CFR Part 1926.62, and no visible accumulations of lead-based paint and dust remain on worksite.
1. Do not remove lead control area or roped-off boundary and warning signs before Contracting Officer's Representative's receipt of CIH's certification.
 2. Re-clean areas showing dust or residual paint chips.
- C. Testing: Where indicated and when directed by Contracting Officer's Representative, test lead-based paint residue and used abrasive according to 40 CFR Part 261 for hazardous waste.
- D. Waste Collection:
1. Collect lead-contaminated materials including waste, scrap, debris, bags, containers, equipment, and clothing, which may produce airborne lead contamination.
 2. Place lead contaminated materials in waste disposal drums. Label each drum identifying waste type according to 49 CFR Part 172 and date waste materials were first put into drum. Obtain and complete the Uniform Hazardous Waste Manifest forms. Comply with land disposal restriction notification requirements required by 40 CFR Part 268:
 3. Coordinate temporary storage location on project site with Contracting Officer's Representative.
- E. Waste Disposal:
1. Do not store hazardous waste drums in temporary storage location longer than 90 calendar days from drum label date.
 2. Remove, transport, and deliver drums to paint disposal facility.
 - a. Obtain signed receipt including date, time, quantity, and description of materials received according to 40 CFR Part 262.
 - b. Obtain final report of materials disposition after disposal completion.

- - - E N D - - -

SECTION 05 00 00
METAL REPAIRS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Steel Repair.
- B. Surface Preparation of Lead Paint before Welding.

1.2 REFERENCES

- A. AWWA D100 Weld Standard
- B. AWS Weld Standard
- C. API 650 Standard

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 OMISSIONS

- A. The specifications include all work and materials necessary for completion of the work. Any incidental item(s) of material, labor, or detail(s) required for the proper execution and completion of the work are included.

1.6 DEFINITIONS

- A. Ground Flush: Ground even with adjacent metal, no transition.
- B. Ground Smooth: Ground welds to the point that no cuts or scratches occur when rubbing your hand over the weld. Rebuild with weld any concavity discovered during grinding.

1.7 WORK INCLUDED

- A. Replace wet interior roof hatch.
- B. Install bottom bracket on the wet interior ladder fall prevention device.
- C. Re-weld wet interior ladder.
- D. Install new sidewall ladder with platform.

- E. Replace roof vent.
- F. Weld cathodic covers.
- G. Install cathodic clips and coupling.
- H. Install roof handrail with painter's rail.
- I. Relocate the antennas and aviation light to the handrail.
- J. Install bowl safety couplings.
- K. Remove level indicator.

1.8 WORKMANSHIP

- A. Provide material and workmanship necessary to produce a first class job.
- B. Complete work in a manner that is least offensive to neighbors.

1.9 WELDER QUALIFICATIONS

- A. Certified for type and position of weld specified.
- B. The welder shall be specialized in industrial or heavy commercial welding, and experienced in rigging and elevated work.

1.10 SUBMITTALS

- A. Safety Data Sheets (SDS) - for all items as required by law.
- B. Welder's Certification.
- C. Submit materials at least one (1) week prior to preconstruction meeting.

1.11 WORK SEQUENCING

- A. The sequence of work is the responsibility of the contractor to determine; however, the following is offered as a "good practices" sequence within the industry:
 - 1. Complete ahead of all cutting and welding all surface preparation, such as immediate area lead paint removal.
 - 2. Complete all welding repairs prior to commencement of any power washing or abrasive blast cleaning.
 - 3. Do not install non-painted items (i.e. vent, fall prevention devices, etc.) or store on or in the tank until after painting has been completed.
 - 4. Remove all fall prevention devices before painting, and reinstall after completion. Do not install new fall prevention devices until all painting has been completed. Supply temporary fall prevention devices with steel cables during blasting and painting.

PART 2 - PRODUCTS

2.1 STEEL PLATING and OTHER STRUCTURAL SHAPES

- A. ASTM - A36.

2.2 BOLTS and NUTS

- A. Stainless Steel
 - 1. ASTM F594G - 316 Stainless Steel Bolts.
 - 2. ASTM F594G - 316 Stainless Steel Nuts.
- B. Galvanized Steel
 - 1. ASTM A307 Grade A zinc coated Steel Bolts.
 - 2. ASTM A307 Grade A zinc coated Nuts.

2.3 WELDS

- A. Final - E70XX Electrodes.
- B. Root - E60XX Electrodes.
- C. Wire - ER70S Electrodes.

2.4 FALL PREVENTION DEVICE

- A. Cable-Type system as manufactured by DBI Sala, supplied by ITI Resources (941) 894-0564.
 - 1. System: Lad-Saf Model and all connecting clips, etc.
 - a. Cable to be 3/8 in. galvanized steel.
 - b. Top Bracket TB-2 #6116056 for vertical ladders with no obstruction so cable extends above the ladder (on new sidewall ladder).
 - c. Bottom Bracket BB-1 #6100090.
 - d. Cable Guides CG-3 #6100400.

2.5 CATHODIC CLIPS and COUPLING

- A. Corrpro clips and coupling for interior, buoyant-type cathodic protection system 1-866-CORRPRO.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION - PREWELDING - LEAD

- A. The existing exterior coating is known to contain lead.
- B. Remove all coating 6-in. on both sides of welding area by abrasive blast cleaning or vacuum shrouded power tool cleaning prior to any cutting, welding, or disturbance of the lead paint.
- C. Chemical stripping or other method may be approved by the engineer.
- D. Absolutely do not begin any repair work until all adjacent lead is properly removed, cleaned, and stored.

3.2 COATING REPAIRS - EXTERIOR

- A. Complete all welding and cutting prior to any surface preparation for painting to avoid contamination of surfaces.
- B. Remove any residue and weld smoke by solvent cleaning.
- C. Power tool clean to a SSPC-SP11 finish all areas damaged by welding.
- D. Use 3M Scotch-Brite Clean'n Strip Discs.
- E. Feather edges of adjacent coating a minimum of ½ in. from exposed steel.
- F. Apply repair system as follows:

<u>Manufacturer</u>	<u>System</u>
Tnemec	N69 (spot)/N69/1074.
Induron	PE-70 (spot)/PE-70/I-6600
Sherwin Williams	646PW(spot)/646PW/Acrolon Ultra

- G. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.

3.3 WET INTERIOR ROOF HATCH

- A. Remove the existing wet interior hatch. Hatch to become property of the contractor for proper disposal.
- B. Furnish and install a 30 in. diameter hinged hatch.
- C. Cover the opening left from removal of the existing hatch. Weld a $\frac{3}{16}$ inch thick reinforcement plate, diameter to be sufficient to overlap any openings. Weld using $\frac{3}{16}$ in. full fillet welds. Caulk the wet interior side with Sikaflex 1a.
- D. Weld a 6 in. x 3 in. x $\frac{5}{8}$ in. diameter rung on the roof for a handhold. Location to be determined by the engineer.
- E. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- F. See Drawing 01.
- G. Payment is a separate line item "Wet Interior Roof Hatch" which the owner reserves the right to delete.

3.4 FALL PREVENTION DEVICE REPAIR

- A. Furnish and install a bottom bracket on the existing wet interior cable-type fall prevention device.
- B. Install per manufacturers recommendations; trim the existing cable as needed.

- C. Payment is a separate line item "Fall Prevention Device Bracket" which the owner reserves the right to delete.

3.5 WET INTERIOR LADDER WELD REPAIR

- A. There is one damaged/corroded weld on the wet interior ladder.
- B. Re-weld the corroded connection point to rejoin the stiffener to the ladder side rail.
- C. If needed patch plate can be used to bridge the opening. Use a minimum of ¼ inch steel for plate.
- D. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- E. Payment is a separate line item "Wet Interior Ladder Repair" which the owner reserves the right to delete.

3.6 NEW SIDEWALL LADDER with PLATFORM

- A. Remove existing sidewall/roof ladder. Ladder to become property of the contractor.
- B. Furnish and install a new sidewall/roof ladder with a platform.
- C. Ladder to be 16 in. wide with ¾ in. diameter rungs, spaced every 12 in. on center, and provide a minimum of 7 in. toe clearance.
- D. Construct side rails of 2 in. x ¾ in. flat bar stock. Spacing of ladder brackets is 10 ft. maximum, with brackets 8 in. from each end.
- E. Ladder shall meet or exceed all OSHA requirements.
- F. Install a cable-type fall prevention device on the new ladder.
- G. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- H. See Drawing 02a-02d.
- I. Payment is a separate line item "Sidewall Ladder with Roof Platform" which the owner reserves the right to delete.

3.7 REPLACE VENT with DOME STYLE ROOF VENT

- A. Remove the existing roof vent. Vent to become property of the contractor for proper disposal.
- B. Furnish and install a new dome style roof vent on a new bolted flange that has been cut and constructed as shown on the drawings.
- C. See Drawings 03.
- D. Payment is a separate line item "Roof Vent" which the owner reserves the right to delete.

3.8 WELD CATHODIC COVERS

- A. Remove all existing cathodic caps and bolts from the roof.
- B. Weld $\frac{1}{4}$ in. plates over all openings, including hole(s) from probe removal using $\frac{3}{16}$ in. continuous fillet weld on the exterior. Caulk the wet interior side with Sikaflex 1a.
- C. Plates to overlap all holes by $\frac{1}{2}$ in. on all sides, including bolt holes.
- D. Grind all welds smooth.
- E. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- F. See Drawing 04.
- G. Payment is a separate line item "Weld Cathodic Covers" which the owner reserves the right to delete.

3.9 CATHODIC CLIPS and COUPLING

- A. Weld cathodic clips on the tank's interior.
- B. Supply recommended quantity, and locate as directed by the supplier.
- C. Weld clips with $\frac{1}{4}$ in. fillet welds all around. No area may be left that may be susceptible to crevice corrosion.
- D. Weld a 3,000 psi coupling inside and outside with a $\frac{1}{4}$ in. fillet weld all around, and cap fitting as directed by supplier.
- E. Remove all slag and spatter. Grind all welds smooth.
- F. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- G. Payment is a separate line item "Cathodic Clips and Coupling" which the owner reserves the right to delete. This line item will be deleted if the full cathodic system is installed as part of this project.

3.10 ROOF HANDRAIL and PAINTER'S RAIL

- A. Install a 22 ft. diameter handrail, and a 24 ft. diameter painter's rail on the roof. Field verify dimensions prior to fabrication.
- B. All butt weld sections on the painters railing to be at a stand-off.
- C. Install 2 in. diameter couplings with brass plugs for safety lines during wet interior work. Threading to be per NPT standard. Locate at every other painter's railing stand-off. The underside of coupling to be caulked. All threaded fittings to be coated with pipe joint compound.

- D. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.
- E. See Drawing 05a-05b.
- F. Payment is a separate line item "Roof Handrail" which the owner reserves the right to delete.

3.11 RELOCATE ANTENNAS and AVIATION LIGHT to the RAILING

- A. Remove the existing two (2) antenna mounting poles on the roof. Grind flush all welds. Rebuild metal if gouged during removal.
- B. Relocate the aviation light to the railing.
- C. Remount the antenna poles (or use new galvanized poles) to the new handrail using galvanized steel U-bolts attached to the top rail, mid rail and kick plate.
- D. Work must be coordinated with the owner. The final location and mounting to be approved by the owner, cable connections to be performed by the antenna owners.
- E. Antenna cable and electrical conduit to be routed along the right side of the sidewall ladder (currently it is on the left side, route to the right side at the balcony) weld 1/8 inch bent plates in one straight line, from the balcony to the roof handrail, spacing to be every 48 inches. Each bent plate is to have holes to accept Andrews snap-in hangers. On the handrail the cable is to be zip tied to the mid-rail every 36 inches max.
- F. All welding for the cable plates are to be 1/8 inch full fillet welds.
- G. Contractor can reuse some or all of the existing conduit, attach conduit to cable bent plate. All wiring to be enclosed and all new aviation light wiring is to match the existing, if a splice is required use a watertight enclosure.
- H. U-bolt light mounting pole to the safety rail using galvanized steel U-bolts, the pole is to be threaded, attach light to the threaded pole, field determine pole size.
- I. Contractor to ensure lights are operational after relocation.
- J. See Drawing 06 for antenna mount.

3.12 BOWL SAFETY COUPLINGS

- A. Install extra heavy couplings on the bowl.

- B. Bowl couplings to be located at the mid-point between the riser and each leg. Coupling location to be the center point between the riser and each leg.
- C. Plug each coupling with a hex head steel plug. All couplings and plugs to be threaded per NPT standard. All threaded fittings to be coated with pipe joint compound.
- D. Engineer to field verify locations of couplings.
- E. See Drawing 07.
- F. Surface prepare and coat in accordance with Sections 09 97 13 and 09 97 13.10.

3.13 LEVEL INDICATOR REMOVAL

- A. Remove the level indicator from the sidewall and roof including all paraphernalia.
- B. Removed items to become property of the contractor for proper disposal.
- C. Cut all braces and lugs. Grind all lugs flush with adjacent base metal. In the event the base metal is gouged by cutting of the ladder, build-up affected areas to original steel thickness. Grind all re-welding flush with adjacent surfaces.
- D. Weld 1/4 in. plates over all openings using $\frac{3}{16}$ in. continuous fillet weld on the exterior. Plates to overlap holes by a minimum of $\frac{1}{2}$ in. on all sides. Caulk the wet interior side with Sikaflex 1a.
- E. Payment is a separate line item "Level Indicator Removal" which the owner reserves the right to delete.

PART 4 - SPECIAL PROVISIONS

4.1 PAINT REPAIR - STEEL REPLACEMENT

- A. All large pieces of steel to be shop primed using the specified prime coat over a SSPC-SP10 near white surface preparation.
- B. Do not prime 3 in. from area to be welded.
- C. After installation, spot clean welded areas to a SSPC-SP11 and apply coating as specified.
- D. Use only one manufacturer for repairs.

- - End - -

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

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

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

- A. SECTION 01 00 00 GENERAL REQUIREMENTS
- B. SECTION 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

1.4 CERTIFICATION:

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

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Installer qualifications.
- C. Contractor certification.
- D. Manufacturer's installation instructions for each product used.
- E. Cured samples of exposed sealants for each color.
- F. Manufacturer's Literature and Data:
 - 1. Primers

2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

G. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:

- a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
- b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

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

1.8 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Backing Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.9 WARRANTY:

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

- B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 APPLICABLE PUBLICATIONS:

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

- B. ASTM International (ASTM):

C509-06.....Elastomeric Cellular Preformed Gasket and
Sealing Material
C612-14.....Mineral Fiber Block and Board Thermal
Insulation
C717-14a.....Standard Terminology of Building Seals and
Sealants
C734-06 (R2012).....Test Method for Low-Temperature Flexibility of
Latex Sealants after Artificial Weathering
C794-10.....Test Method for Adhesion-in-Peel of Elastomeric
Joint Sealants
C919-12.....Use of Sealants in Acoustical Applications.
C920-14a.....Elastomeric Joint Sealants.
C1021-08 (R2014).....Laboratories Engaged in Testing of Building
Sealants
C1193-13.....Standard Guide for Use of Joint Sealants.
C1248-08 (R2012).....Test Method for Staining of Porous Substrate by
Joint Sealants
C1330-02 (R2013).....Cylindrical Sealant Backing for Use with Cold
Liquid Applied Sealants
C1521-13.....Standard Practice for Evaluating Adhesion of
Installed Weatherproofing Sealant Joints
D217-10.....Test Methods for Cone Penetration of
Lubricating Grease
D1056-14.....Specification for Flexible Cellular Materials—
Sponge or Expanded Rubber
E84-09.....Surface Burning Characteristics of Building
Materials

- C. Sealant, Waterproofing and Restoration Institute (SWRI).

SWRI STPG-13 Sealants: The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. S-1 Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
2. S-2 Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
 - a. Voids where water monitoring sample water lines penetrate exterior masonry wall.

B. Interior Sealants:

1. S-4 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25, Use NT.
2. Provide location(s) of interior sealant as follows:
 - a. Voids where water monitoring sample water lines penetrate exterior masonry wall.

2.2 COLOR:

- A. Sealants used with exposed masonry shall match color of mortar joints.
- B. Sealants used with unpainted concrete shall match color of adjacent concrete.
- C. Color of sealants for other locations shall light gray or aluminum, unless otherwise indicated in Construction Documents.

2.3 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at

temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

2.4 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.5 CLEANERS-NON POROUS SURFACES:

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners shall be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI STPG.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include - but are not limited to - the following:
 - a. Concrete.
 - b. Masonry.

- c. Unglazed surfaces of ceramic tile.
- 3. Remove laitance and form-release agents from concrete.
- 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include - but are not limited to - the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
 - 1. Apply primer prior to installation of back-up rod or bond-breaker tape.
 - 2. Use brush or other approved means that will reach all parts of joints. Avoid application to - or spillage onto - adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth one-half of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately one-half of depth at adhesion surface.

3.5 INSTALLATION:

A. General:

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

3.6 FIELD QUALITY CONTROL:

- A. Field-Adhesion Testing: Field-test joint-sealant adhesion to joint substrates according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 10 tests for first 305 m (1000 feet) of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 305 m (1000 feet) of joint length thereafter or one test per each floor per elevation.
- B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
- C. Inspect tested joints and report on following:
 - 1. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 2. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - 3. Whether sealants filled joint cavities and are free from voids.
 - 4. Whether sealant dimensions and configurations comply with specified requirements.
- D. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
- E. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- F. Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements, will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with

other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.7 CLEANING:

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

- - - E N D - - -

SECTION 09 97 13
STEEL COATING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Painting of steel structures.
- B. Interior Cleaning and Disinfection.**

1.02 REFERENCES

- A. AWWA Standards:
 - 1. D102 - 11 Painting Steel Water Storage Tanks.
 - 2. C652 - Disinfection of Water Storage Facilities.

1.03 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.04 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 WORK INCLUDED

- A. Exterior: Apply a four (4) coat zinc epoxy urethane system, the orange FAA sections are to have a fluoropolymer topcoat.
- B. Wet Interior: Apply a three (3) coat zinc epoxy system, apply a polyurethane caulk to the roof lap seams.
- C. Pit Piping: Apply a two (2) coat epoxy system.

1.6 EXISTING CONDITIONS

- A. Exterior: Acrylic coating tested for lead at 2.7% by weight.
- B. Wet Interior: Epoxy system applied in 2017.
- C. Pit Piping: Unknown system presumed to contain lead.

1.7 INCIDENTAL ITEMS

- A. It is the intent of these specifications to coat the structure for the purpose of corrosion protection on wet interior surfaces. It is the intent to coat the exterior for corrosion protection and aesthetics.

- B. See 01 00 00 GENERAL REQUIREMENTS for Contractor's responsibility for performing incidental work at no additional cost to the owner.

1.8 PAINTER QUALIFICATIONS - NON-LEAD PROJECTS

- A. Contractor shall complete all coating and surface preparation.
- B. Painter shall be specialized in industrial or heavy commercial painting.
- C. ALL CONTRACTORS SHALL BE PREQUALIFIED with Dixon Engineering for projects of this size and complexity.

1.9 SUBMITTALS

- A. Submit the following with your annual prequalification:
 - 1. Occupational Safety and Health Programs and certification that all site personnel have been trained as required by law.
- B. Submit the following ten (10) days prior to the preconstruction meeting:
 - 1. Safety Data Sheets (SDS) and Product Data Sheets:
 - a. Furnish from all suppliers Safety Data Sheets and product data sheets for all applicable materials including, but not limited to, paints, thinners, cleaners, degreasers, and abrasive materials.
 - b. Provide for employees one (1) copy of all data sheets at the job site for employee access.
 - c. Provide two (2) copies to the owner.
 - d. Provide two (2) copies to the engineer.
 - e. No work may commence without the complete filing. All SDS shall conform to requirements of SARA (EPCRA) Right-to-Know Act.
 - 2. Ventilation Design Plan. Include airflow calculations and model, and number of fans.
 - 3. Dehumidification/Heat Design Plan. Include airflow calculations, model, number of units used, connection details, and power source.
 - 4. Fall Prevention Plan and Site Specific Fall Hazard Evaluation:
 - a. Site specific plan to contain a generic drawing of the existing structure and appurtenances of this structure and reflect safety changes specified for this project.

- b. Certifications for all spiders, scaffolding, stages, etc. to be used on the project. All certifications to be current, less than one year old.
- C. Submit the following at the preconstruction meeting:
 - 1. Designated OSHA Competent Person and qualifications, if not previously submitted.
 - 2. Waste hauler and disposal facility.
 - 3. Submit all power tools and attachments to be used during the project.
- D. Submit the following within two (2) weeks of completion with final pay request:
 - 1. Waste manifest.
 - 2. Waivers of lien.
 - 3. Copies of any formal worker safety or environmental citations received on the project.

1.10 OWNER RESPONSIBILITY

- A. Drain the structure with seven (7) days' notice, after contractor meets all precedent conditions of the contract.
- B. Draw samples and test after chlorination; responsibility of good results remains with the contractor. Poor test results could result in added costs to contractor, including re-chlorination, cost of water, plus possible liquidated damages.

1.11 DELIVERY and STORAGE of MATERIAL

- A. Submit manufacturer's invoice, with or without paint cost, to the engineer for review. This submittal will be used to identify the quantity of paint recommended by the manufacturer for a job of this size and design, and will be used to check the quantity actually delivered to the project.
- B. Cover bulk materials subject to deterioration because of dampness, weather, or contamination, and protect while in storage.
- C. Maintain materials in original, sealed containers, unopened and with labels plainly indicating the manufacturer's name, brand, type, grade of material, and batch numbers.
- D. Remove from the work site containers that are broken, opened, water marked, and/or contain caked, lumpy, or otherwise damaged materials. They are unacceptable.

- E. Store the material in a climate controlled designated area where the temperature will not exceed the manufacturer's storage recommendations. Heat the storage area to the manufacturer's recommended minimum mixing temperature.
- F. Keep equipment stored outdoors from contact with the ground, away from areas subject to flooding, and covered with weatherproof plastic sheeting or tarpaulins.
- G. Store all painting materials in a location outside the structure.
- H. Do not store or have on-site unapproved material, material from different manufacturers, or materials from different projects.

1.12 ACCESS and INSPECTOR SAFETY

- A. Provide access to all portions of the project where work is being completed. Access must be close enough and secure enough to allow inspector to use inspection equipment without extensions.
- B. Provide personnel to assist with access and to ensure contractor's access equipment is safely used.
- C. Provide separate fall protection for owner and inspectors. Limit fall to 5 ft. vertically.
- D. New safety tie-off points have been added (as part of this project - see Section 05 00 00 Metal Repairs) to the interior roof for interior safety and the bowl for safety lines under the exterior bowl. Do not rig equipment from these points. Provide separate fall protection cables and safety grabs for each tie-off point.
- E. These specifications require the contractor to supply a separate fall protection cable and safety grab for each tie-off point for the inspector's use. The contractor is encouraged to provide a separate cable and tie-off for each of his personnel. The cables may be connected to the same tie-off point as the inspector's, but a separate cable and safety grab are required for each user.
- F. See Section 05 00 00 for specific locations of safety line tie-off points.

1.13 INSPECTION and TESTING

- A. Prior to the scheduled inspection, remove all dust, spent abrasive, and foreign material from the surface to be coated.
- B. Furnish an instrument for measuring the wet film thickness, and also dry film thickness of each field coat of paint. The dry film thickness testing gauge shall be the magnetic type as manufactured

by Elcometer Co., or the Nordson Gauge Co.; spring loaded model with two percent (2%) accuracy margin over a range of one-to-twenty-one (1-21) mils or equal.

- C. Certify to the owner that the specified paint has been applied at the paint manufacturer's recommended coverage, and to the specified thickness required. Also, certify that the paint has been applied in accordance with this contract.
- D. Take all necessary steps, including dry striping by brush or roller, to ensure a holiday-free coating system.
- E. The interior coatings are subject to low voltage holiday testing.
- F. The owner and engineer reserve the right to perform destructive testing under conditions deemed necessary. Testing may include, but is not limited to, the Tooke thickness test and adhesion testing. Any damage caused by these tests will be corrected to specifications at the contractor's expense.

1.14 CLIMATIC CONDITIONS

- A. Do not apply paint when the temperature, as measured in the shade, is below the manufacturer's required ambient and surface temperatures.
- B. Do not apply paint to wet or damp surfaces, or during rain, snow, or fog.
- C. Do not apply paint when it is expected the relative humidity will exceed 85%, or the surface temperature is less than 5° above dew point, or the air temperature will drop below the manufacturer's requirements for proper cure. Anticipate dew or moisture condensation, and if such conditions are prevalent, delay painting until the owner is satisfied the surfaces are dry.

1.15 APPLICATION

- A. Complete all painting and surface preparation in strict accordance with these specifications, approved paint manufacturer's specifications, and good painting practices per SSPC.
- B. Apply each coating at the rate and in the manner specified by the manufacturer. Check the wet film thickness every 200 sq. ft. to ensure each coat applied meets the dry film thickness range requirements.

- C. Allow sufficient time for each coat of paint to dry and cure.
Allow a minimum of twenty-four (24) hours between coats, unless product requirements have a maximum time less than 24 hours.
- D. Apply exterior coating by brush and roller only. Spray application is not permitted without prior approval of the engineer. Even with prior approval, responsibility for damage still remains with the contractor.
- E. Painting may be delayed because of poor coverage, the possibility of paint drying too rapidly, or the potential damage from overspray and/or dry spray. In all cases, responsibility for damages rests with the contractor.
- F. The contractor is responsible for the appearance of the finished project, and is warned to prevent contact with any freshly applied coating. Removal of rigging shall be completed so not to mar or damage the coating.
- G. Coatings shall be applied using methods to eliminate roller or spray marks in the finished product on the exterior.
- H. Stripe the wet interior prior to application of final coat.
- I. Additional coats required for coverage or to eliminate roller marks, spray marks and to repair dry spray and overspray are the responsibility of the contractor at no additional cost to the owner.
- J. Use of pole extension on spray guns is prohibited for all paint application.
- K. Mixing of partial kits is not permitted. All partial cans of coating must be removed from the site.
- L. Mixing blades to be clean. The engineer has the right to reject mixing blades based on cleanliness or paint build-up. Do not use the same mixing blade for different coatings (i.e. epoxy and urethane coatings).

1.16 PRESSURE RELIEF VALVES

- A. Furnish two (2) pressure relief valves with National Standard Threads designed to waste 250 gallons per minutes at 10 lbs. over pressure.
- B. The valves shall be Jayco - Model 22 in., or equal.
- C. Supply three (3) days prior to draining of the structure.

- D. After work to the structure and successful disinfection have been completed, the owner will return the valves to the possession of the contractor.

PART 2 - PRODUCTS

2.01 COLOR

A. Exterior Coatings:

1. Supply the engineer with a color chart to allow the owner ample time for the exterior topcoat color selection.
2. Factory tint the intermediate coat(s) for all areas of the structure if similar to the finish coat. Tinting shall be sufficient to allow visibility of the dissimilar color from 1 ft., and from 100 ft.
3. After evaluating the bids, the owner shall select the color. All bids shall be based on common "tank white " color with FAA orange checkers on the roof and sidewall.

B. Wet Interior Coatings:

1. The color is to be a different tint between coats. Tinting to be performed in the factory.

2.02 SUBSTITUTIONS

- A. All coatings specified and approved herein have met or exceeded a specified list of ASTM standards. The materials specified are the standard to which all others shall be compared. Contractors deviating from those products used as the basis of design are responsible to meet, or exceed, products specified.
- B. The purpose is to establish a standard of design and quality.
- C. Approval by ANSI/NSF Standard 61 is also a requirement for potable water contact coatings.
- D. The selection of coatings also has taken into consideration the manufacturer's current and past performance on availability, stocking, and shipping capabilities, ability to resolve disputes, and any applicable warranties.

2.03 DEHUMIDIFICATION - WET INTERIOR

- A. Supply dehumidification units capable of maintaining dew point temperature lower than 15° below surface temperature during blasting and lower than 5° during coating application and cure, and steel temperature maintained above the manufacturer's printed requirements.

- B. Supply a dehumidifier designed with a solid desiccant having a single rotary desiccant bed capable of continuous operation, with full automatic operation. Do not use liquid desiccant, granular, or loose lithium chloride drying systems. Refrigerant systems may be used in conjunction with desiccant units.
- C. Plumbing, noise control, insulation, venting, and all incidental items needed to provide proper ambient conditions shall be included as one package.
- D. Supply and maintain a power source for the dehumidifier, unless otherwise specified.

2.04 DUST COLLECTORS - AIR FILTRATION UNITS

- A. Furnish and use a dust collector during all blasting work.
- B. Units to be equal in filtration capacity to Eagle Industries dust collectors. Other units may be used, but their substitution will be evaluated on efficiency at 0.5 micron size and airflow movement.
- C. Use 20,000 cfm minimum for wet interior work.
- D. Substitution of steel grit blasting may decrease the requirements above. New requirements will be defined by the engineer based on the efficiency of the contractor's equipment.
- E. Furnish HEPA filters for dust collection.
- F. Number of dust collectors shall be sufficient to supply a 50 ft./minute downward draft at most areas. An average may be considered. Determination of actual containment plan will be the deciding factor. Calculations of airflow shall be included in the containment submittal.
- G. Use only new filters or filters certified clean.

2.5 GROUND TARPS

- A. Use impermeable ground tarps, 20 mils thick.
- B. Use ground tarps able to withstand the anticipated construction traffic without tearing or separating.

2.6 EQUIPMENT COVERING

- A. Use material that is 8 - 10 mils thick, and 100% impermeable to all vulnerable equipment.
- B. Use material resistant to tear and/or rip by mechanical action from abrasive blasting during blasting operations.
- C. Make coverings airtight by use of duct tape at the openings, or other suitable measures.

- D. Meet with representative of equipment owner to verify covering will not damage equipment. Damage is the contractor's responsibility. This includes not only the owner's equipment, but also telecommunication antennas, cables, buildings, controls, etc.

2.7 AIR DRYER for COMPRESSOR

- A. Use air dryers sufficient to remove 98% of the moisture from the compressed air. Size the dryers on total cfm using manufacturer supplied charts. Upon request, supply charts to engineer for verification.
- B. If the fan is not operable, cease all blasting until the dryer is replaced or repaired.
- C. Supply air dryer with an air draw-off valve to check air for dryness, oil contamination, and cleanliness on the outlet side of the air dryer.
- D. For cleaning operations, draw clean air from the outlet side of the air dryer.

PART 3 - EXECUTION

3.1 DISINFECTION

- A. Disinfect the completely painted structure in accordance with AWWA Standard C652 Chlorination Method No. 3.
- B. Furnish the material and labor necessary to disinfect the structure in the required manner. Assist owner during filling and sampling. Promptly repair any defects in the work that may appear.
- C. Do not allow water to enter the distribution system until the structure is proven chemically and bacteriologically safe.
- D. Water vented to waste may not contain any substances in concentrations that can adversely affect the natural environment. No total residual chlorine may be measured in water discharged to surface water.
- E. Pay all additional expenses if it is necessary to repeat the testing and disinfection procedure as a result of defective work or defective testing.

3.2 PROTECTION of NON-WORK AREAS

- A. Protect all non-blasted/painted surfaces prior to all abrasive blast cleaning/painting.

- B. Thoroughly cover the fill/drain pipe, overflow pipe, and all other openings. Do not permit abrasive or paint chips to enter into the piping or distribution system. Use watertight seals on the pipes.
- C. Protect and seal all controls and electrical components (even if they are not in the immediate work area) that are in danger from the project. Coordinate with the owner so all controls are shut down and/or vented if necessary.

3.3 ANTENNA SYSTEM PROTECTION

- A. There are two (2) antennas mounted on the roof. The number of antennas listed are from the last known condition, the contractor is to field verify number of antennas.
- B. There are cables routed from the ground up to the antennas with miscellaneous sensitive equipment mounted on the structure and control equipment located on the ground.
- C. Use material that is 100% impermeable to cover and protect all antennas, antenna cables, and antenna controls/buildings.
- D. Use material resistant to tear by mechanical action from abrasive blasting, power washing and coating application.
- E. Payment for damage to antennas, antenna cables, miscellaneous equipment and/or antenna controls/buildings is the responsibility of the contractor.
- F. Contact the owner of each set of antennas one (1) week prior to the beginning of construction. Name of antenna companies will be available at the preconstruction meeting.
- G. Antennas may remain in service during the project. The contractor is responsible for their own RF safety. Contractor to provide a minimum of one RF monitor for employees on site for the duration of the project.

3.4 ANTENNA EQUIPMENT COATING

- A. Antenna equipment including but not limited to: brackets and mounting poles are to be surface prepared and coated to match the exterior tank in these specifications.
- B. All previously coated items are to be coated per the exterior specifications. Any galvanized, stainless steel or other uncoated materials are to remain uncoated.

3.5 GROUND COVER during WATER CLEANING

- A. Protect the ground from contamination. Tarp at least 10 ft. from the structure's base.
- B. Lap all ground tarps a minimum of 2 ft.

3.6 DEHUMIDIFICATION

- A. Control the environment with dehumidification equipment twenty-four (24) hours a day during blast cleaning, coating operations, and 48 hours after the topcoat (including holiday touch-ups and repairs are performed) as a minimum to maintain ambient conditions until cure completion.
- B. Supply sufficient dry air to assure the air adjacent to surfaces to be abrasive blast cleaned or coated does not exceed minimum required humidity at any time during the blasting, coating, or curing cycle.
- C. Monitor and record ambient conditions twenty-four (24) hours a day throughout abrasive blast cleaning and painting work (use Polygon Exact Aire, DRYCO ClimaTrack, DH Tech HOB0U30 data logger, or approved equal). Monitor to be capable of being programmed with condition parameters and of alerting contractor, engineer and owner via phone or e-mail of condition or equipment failures.
- D. Contractor to manually test interior ambient conditions three (3) times a day, or more often with rapid weather changes. Record daily readings. Adjust or add equipment as required to maintain dew point, and humidity. (This is in addition to the monitor with recorder noted above).
- E. Use a minimum 2,000 cfm dehumidification capacity for wet interior work.
- F. Surround the units with noise suppressant enclosures, unless units are sound attenuated or have noise suppressants. More extensive enclosure requirements are required in residential areas where the machines must run all night. Noise suppressant level needed will depend on the size of the dehumidification units, their efficiency, and their locations. Provide noise suppressant enclosures of sufficient height and thickness to lower noise to an acceptable level for neighbors. Also provide noise suppressant enclosures for generators.
- G. Seal off the work, allowing air to escape at the bottom of the space away from the point where the dehumidified air is being

introduced. Maintain a slight positive pressure in the work unless the dust from the blasting operation is hazardous.

- H. Where necessary to filter the air escaping the space, design the filtration system to match the air volume of the dehumidification equipment in such a way that it will not interfere with the dehumidification equipment's capacity to control the space as described herein. Do not re-circulate the air from the work or from filtration equipment back through the dehumidifier when coating or solvent vapors are present. Outside air is to be used during those periods.
- I. Securely attach duct work to the equipment and work to minimize air loss. Design hoses with sufficient capacity and minimal bends to reduce friction loss.
- J. Dehumidification and its operating power source are incidental to the respective painting project (wet or dry interior).
- K. Set-up and operate equipment twenty-four (24) hours (or earlier) prior to start of blasting.

3.7 DUST CONTAINMENT - INTERIOR

- A. No visible dust release is allowed from roof openings and other access openings. Seal or close all openings prior to blasting (see ventilation requirements).
- B. Connect the air filtration unit directly to a manhole extension.
- C. Design the manhole extension to allow access of hoses through a side exit that is sealable after hoses are in-place. Install the air filtration unit directly to the end of the extension.
- D. Seal of the side exit will be tested by holding a smoke agent 6 in. outside the seal with the air filtration unit operating. If smoke is drawn to the seal area, additional sealing will be necessary.
- E. The contractor may reverse this operation by connecting the air filtration unit to the roof manhole and sealing around the hose. Also seal the roof vent. A sealed semi-rigid structure also may be used where employees have access through a side door. 90% of the air draw must be from the tank proper.
- F. Construct the semi-rigid structure from 8 ft. x 8 ft. x 6 ft. high scaffold framing and cover with tarps, with all edges lapped 2 ft. minimum and an overlapped entranceway.

3.8 VENTILATION REQUIREMENTS

- A. Supply mechanical ventilation sufficient to change air in the tank six (6) times each hour.
- B. In calculating air exchange, the dust collector air capacity can be considered a part of the air being changed up to 50% of ventilation requirements.
- C. Use roof, riser or sidewall manholes with fans to move the required air.
- D. Ventilate wet interior areas a minimum of seven (7) days after completion of painting, or longer until the wet interior coating has fully cured. Maintain ventilation at the rate of two (2) complete air changes per hour. The owner reserves the right to perform a MEK Solvent Double Rub Test per ASTM D 4752 to verify the cure of the coating film prior to returning the tank to service.
- E. Additional ventilation openings may have to be installed by the contractor. Submit size, details, and location(s) for approval by the owner prior to cutting any opening. All costs associated with repairs by a certified welder are incidental
- F. Connect the air filtration unit per this Section, Dust Containment - Interior. All fans on the roof and sidewalls must blow in. If all openings are not needed for ventilation, seal them. Zero release to the atmosphere will be permitted.

3.9 LIGHTING of WORK SPACE

- A. Provide durable lighting fixtures designed for the intended work environment for use during blasting, painting, and during all inspections.
- B. Encase portable lamps in a non-conductive, shatterproof material. Use only heavily insulated cable with an abrasive resistant casing.
- C. Install all temporary electrical items in accordance with all local, state, and federal codes, including OSHA.
- D. Protect from paint overspray and damage from abrasive materials.
- E. Measure required illumination during surface preparation and coating application at the work surface. Supply 20 ft. candles minimum illumination during blasting and painting, and 30 ft. candles minimum prior to and during inspection, per SSPC-Guide 12. Inspect the prepared surface at the higher illumination prior to calling for inspection. All work must conform to specification requirements prior to the scheduled inspection.

F. Measure the illumination at the work surface in the plane of the work.

PART 4 - SPECIAL PROVISIONS

4.1 WELD PREPARATION PRIOR to COATING

A. Prepare all new welds per NACE RPO 0178 prior to coating application. Grind welds to category D.

4.2 SCHEDULING

- A. Complete all welding and any other work that damages the coating before paint operations begin, including surface preparation. The exception is paint removal in the weld area.
- B. If contractor wants a variance in this schedule, request the change and give reason in writing to the project manager. The project manager will reply with a written Field Order if change is approved. Engineer reserves the right to put further restrictions in Field Order. If contractor objects to restrictions, he may revert to the original specifications.

4.3 GRASS RESTORATION

- A. The contractor is to report any damaged ground at the construction site in writing to the COR prior to mobilization of equipment, otherwise all repairs to the damaged ground will be the responsibility of the contractor.
- B. Refill all holes, ruts etc., and level area around the construction site to the original grade.
- C. Fill material to be clean soil, no gravel, rocks or construction debris is to be used as fill material without the owners consent.
- D. Bring soil to a friable condition by disking, harrowing, or otherwise loosening and mixing to a depth of 3 in. - 4 in. Thoroughly break all lumps and clods.
- E. Rake area to be seeded. Sow seed at a minimum rate of 220 lbs/acre. Use seed intended for the climate.
- F. Work to be completed to the owner's satisfaction.

- - End - -

SECTION 09 97 13.10
STEEL COATING SURFACE PREPARATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Full Field Abrasive Blasting.

1.2 REFERENCES

- A. AWWA Standards:
 - 1. D102-11 Painting Steel Water Storage Tanks.
- B. SSPC and NACE Standards:
 - 1. SP6/NACE No. 3 - Commercial Abrasive Blast.
 - 2. SP10/NACE No. 2 - Near White Metal Abrasive Blast.
 - 3. VIS 1 (Visual standard for abrasive blasted metal).

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- D. 02 83 33.13

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 WORK INCLUDED - SURFACE PREPARATION

- A. Exterior: Abrasive blast clean to a SSPC-SP6 commercial standard with containment.
- B. Wet Interior: Abrasive blast clean to a SSPC-SP10 near white metal standard.
- C. Pit Piping: Abrasive blast clean to a SSPC-SP6 commercial standard.
- D. Lead/Chrome Paint: For additional requirements see Section 09 97 13.12 Lead/Chrome Disposal.
- E. Containment: For additional requirement see Section 09 97 13.11.01.

1.6 WASTE SAMPLING

- A. Sample waste from each portion of the project and keep waste segregated. Send to a NLLAP certified lab and test for TCLP for eight (8) metals (Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver).
- B. The WJB Dorn VA Medical Center reserves the right to collect samples and to send them to an independent lab. This will be determined at the preconstruction meeting.
- C. Pay all lab fees for eight (8) metals TCLP analysis on waste samples, and any subsequent testing if clean-up is warranted.

PART 2 - PRODUCTS

2.1 EXTERIOR TANK CLEANER

- A. United 727 Weather-Zyme as manufactured by United Laboratories, 320 37th Ave., St. Charles, IL 60174 1-800-323-2594.

2.2 ABRASIVE - COAL SLAG - NON-LEAD SURFACES

- A. The coal slag shall be 20-40 grade, or 30-60 grade.
- B. The abrasive shall be free of moisture, water soluble contaminants, dust, and oil.
- C. The abrasive shall be stored and covered to prevent moisture contamination.
- D. All leaking or spilling bags shall be removed, and affected areas properly cleaned.
- E. All slag abrasive shall meet the requirements of SSPC-AB1 "Mineral and Slag Abrasive" June 1, 1991-Grade 3.
- F. The use of silica sand, flint sand, and glass beads is prohibited.
- G. All abrasive and grit material used, and all equipment supplied shall be subject to approval of the engineer. The abrasive or grit shall be sharp enough and hard enough to remove the mill scale, rust, and paint.

2.3 ABRASIVE with BLASTOX - PIT PIPING - LEAD

- A. The abrasive shall be 20-40 grade, or 30-60 grade coal slag blended with Blastox. The mixture shall be proportioned by supplier, but not less than 15% Blastox.
- B. Other low dust abrasive may be used at the same proportion.
- C. The abrasive shall be free of moisture, water soluble contaminants, dust, and oil.
- D. The abrasive shall be stored and covered to prevent moisture contamination.

- E. All leaking or spilling bags shall be removed, and affected areas properly cleaned.
- F. All slag abrasive shall meet requirements of SSPC-AB1 "Mineral and Slag Abrasive" June 1, 1991-Grade 3.
- G. The use of silica sand, flint sand, and glass beads is prohibited.
- H. All abrasive and grit material used, and all equipment supplied shall be subject to approval of the engineer. The abrasive or grit shall be sharp enough and hard enough to remove the mill scale, rust, and paint.
- I. Blastox used for non-immersion surfaces only.

2.4 RECYCLABLE STEEL GRIT - ALTERNATE

- A. Use recyclable steel grit size G-25 or G-50.
- B. The abrasive is to be free of moisture, water soluble contaminants, dust, and oil.
- C. The abrasive is to be stored and covered to prevent moisture contamination.
- D. All leaking or spilling containers are to be removed, and affected areas properly cleaned.
- E. All recyclable steel grit shall meet requirements of SSPC-AB1 "Metallic Abrasive" June 1, 1991.
- F. All abrasive and grit material used, and all equipment supplied shall be subject to approval of the engineer. The abrasive or grit shall be sharp enough and hard enough to remove the mill scale, rust, and paint.

PART 3 - EXECUTION

3.1 PRE-SURFACE PREPARATION - EXTERIOR

- A. Low pressure water clean at 4,000 psi all surfaces and appurtenances to remove mildew, soot, and other contaminants.
- B. Use a biodegradable algicide for the exterior approved by the engineer.
- C. Hand wash with a higher concentration of algicide any mildew not removed by power washing.
- D. Mix algicide at level recommended by the manufacturer, but not at a level that could result in an environmental problem.
- E. Hold water jet nozzle using a 0° or 15° tip perpendicular (90° to surface) at all times. Maintain a water jet nozzle distance of 2 in. - 10 in. from the surface.

3.2 COMMERCIAL BLAST (SSPC-SP6) - EXTERIOR AND PIT PIPING

- A. Abrasive blast clean all surfaces and appurtenances to a commercial finish (SSPC-SP6), latest edition thereof.
- B. Maintain a profile of 1.0 - 2.0 mils on abrasive blast cleaned surfaces.

3.3 SURFACE PREPARATION - WET INTERIOR

- A. Low pressure water clean at 4,000 psi all surfaces and appurtenances to remove sediment, minerals, soot, and other contaminants.
- B. Staining may remain in place prior to abrasive blast cleaning, engineer, consulting with the COR, to approve cleanliness.

3.4 NEAR WHITE METAL (SSPC-SP10) DRY BLAST - WET INTERIOR

- A. Abrasive blast clean all surfaces and appurtenances to a near white metal finish (SSPC-SP10), latest edition thereof.
- B. Maintain a profile of 2.0 - 3.0 mils on abrasive blast cleaned surfaces.
- C. All interior abrasive blast cleaning is to be completed and all spent abrasive removed, and surfaces thoroughly cleaned prior to any primer application.
- D. Once an area is acceptable for painting, apply all coats and allow coating to cure to touch prior to resumption of blasting or blast the entire tank before painting, use dehumidification to hold the blast. It is the contractor's discretion and responsibility to determine if the entire tank is to be blasted, or what size is to be blasted and coated (all coats).
- E. The contractor is responsible for supplying heat and dehumidification to maintain blast conditions.

3.5 COMMERCIAL BLAST (SSPC-SP6) - PIT PIPING

- C. Abrasive blast clean all surfaces and appurtenances to a commercial finish (SSPC-SP6), latest edition thereof.
- D. Maintain a profile of 1.0 - 2.0 mils on abrasive blast cleaned surfaces.

3.6 HAZARDOUS WASTE DISPOSAL

- A. Contract directly with a licensed hazardous waste hauler who is properly licensed in the State of South Carolina to haul hazardous material.

- B. Transport the debris for treatment to a licensed hazardous waste disposal site.
- C. The contractor will not be paid any retainage until paperwork has been submitted, including submittal of the hazardous waste manifest. Any original of the hazardous waste manifest shall be returned to the owner.
- D. Remove all hazardous waste from the site within thirty (30) days of **completion of the blasting portion of the project.**

3.7 WASTE DISPOSAL - NON-HAZARDOUS

- A. If after testing of the spent abrasive material the TCLP tests indicate the abrasive is not a hazardous waste, dispose the abrasive in a waste disposal facility.
- B. All waste shall be handled by a licensed hauler. Supply the owner with all proper documentation of the final disposal site. The actual bill of lading and all manifests will be required prior to any payment.

3.8 WASTE DOCUMENTATION

- A. Supply proper documentation of storage, transportation, and treatment, or disposal of the waste to the owner. The owner will retain sufficient funds to pay for hazardous waste transportation, treatment, and any possible fines until all documentation has been received. This retainage will be held, even if the waste has tested non-hazardous.

3.9 TESTING and CLEAN-UP of WASTE

- A. Daily collect all spent abrasive from the ground tarps and dispose in the required receptacles. Prior to receiving test results, spent abrasive shall be stored on ground tarps. The spent abrasive is to be covered and weighted down so no dust can be released.
- B. Furnish containers with proper labels for storage of the spent debris. Containers shall meet requirements of the EPA (or their local counterpart) for hazardous waste disposal. The spent abrasive will be moved directly from the tank into the waste containers. The containers will remain until final test results have been received. Furnishing containers with covers will be incidental to respective repaint, and will not be affected by the owner's final selection of respective interior or exterior disposal.

C. Waste to remain on-site in covered receptacles until waste test
results are received.

- - End - -

SECTION 09 97 13.11.01
CONTAINMENT - FLEXIBLE FRAME SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Flexible Frame Containment System Requirements.

1.2 REFERENCES

A. SSPC Guides:

1. Guide 6 - Containing Debris Generated During Paint Removal Operations.

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 SUBMITTALS

A. Containment Plan.

1.6 ENVIRONMENTAL SAMPLING for EXTERIOR CONTAINMENT

- A. Collect four (4) pre-project soil samples, compile a map, and collect four (4) post-project soil samples. Send samples to a NLLAP certified lab and test for total lead and chrome.
- B. Sample waste from each portion of the project, and keep waste segregated. Send to a NLLAP certified lab and test for TCLP 8 metals.
- C. The owner reserves the right to collect samples and to send them to their selected lab. This will be determined at the preconstruction meeting.
- D. Pay all lab fees for 8 metals TCLP analysis on waste samples, total lead and chrome on soil samples, and any subsequent testing fees if clean-up is warranted.

E. Complete all sampling in accordance with EPA protocol.

PART 2 - PRODUCTS

2.1 DUST COLLECTORS - AIR FILTRATION UNITS

- A. Furnish and use a dust collector during all blasting work.
- B. Units to be equal in filtration capacity to Eagle Industries dust collectors. Other units may be used, but their substitution will be evaluated on efficiency at 0.5 micron size and airflow movement.
- C. Use 20,000 cfm minimum for exterior containment work.
- D. Substitution of steel grit blasting may decrease the requirements of above. New requirements will be defined by the engineer based on the efficiency of the contractor's equipment.
- E. Furnish HEPA filters for dust collection.
- F. Number of dust collectors shall be sufficient to supply a 50 ft./minute downward draft at most areas. An average may be considered. Determination of actual containment plan will be the deciding factor. Calculations of airflow shall be included in the containment submittal.
- G. Use only new filters or filters certified clean.

2.2 GROUND TARPS

- A. Use impermeable ground tarps, 20 mils thick.
- B. Use ground tarps able to withstand the anticipated construction traffic without tearing or separating.

2.3 CONTAINMENT SHROUDS

- A. All shroud material and superstructure shall be non-penetrating, nylon rip-stop material manufactured by Eagle Industries, or approved equal. Approval of alternate material will be based on density, weight, support strength, stitching, reinforcement, home office experience, and staff assistance.

2.4 CONTAINMENT CONNECTIONS to TANK

- A. Steel plating and other Structural Shapes - ASTM A36.
- B. Bolts - ASTM A307.

C. Welds - E70XX Electrodes.

PART 3 - EXECUTION

3.1 DUST CONTAINMENT - EXTERIOR

- A. Do everything within industry standards to minimize dust as a nuisance. Required procedures include: angle of abrasive impact, direction of nozzle spray, orifice pressure, and work stoppage due to wind speed or direction.
- B. Complete any additional measures required in these specifications. There will be no negotiations for extra compensation for nuisance complaints and corrective measures.
- C. Fully inspect the area, land use, and other pertinent local conditions prior to bidding exterior work.
- D. Do not permit dust, abrasive, or paint chips to fall outside the containment system perimeter or ground cover.
- E. Do not permit any visual dust release when transferring abrasive from either the interior or exterior of the structure to the dumpsters. Suppress dust with tarps or water, or other preapproved method.

3.2 CONTAINMENT during ABRASIVE BLAST CLEANING - EXTERIOR - SSPC-GUIDE 6 - CLASS 1A

- A. Furnish and install a total containment system to be used during all dust generating work.
- B. This specification is intended to be performance based. Alternative procedures to accomplish the same purpose of dust or lead elimination may be submitted for review. The final determination if the alternate performs as well as total containment will rest solely with the engineer. Printed material and test results by independent firms will be considered, but not govern. Rejection of an alternative after bid opening will not relieve the contractor of any responsibility to complete the work as bid, unless his bid states that his bid is to be withdrawn if the alternate is

rejected. Submit a sketch of the alternate containment procedures with bid.

- C. Contain waste abrasive and paint chips to the area immediately under the structure. No release outside the containment system will be permitted. The shrouds will be erected on all sides of the tank for 360°.
- D. Cover the roof with containment shrouds. Separate vertical tarps from the roof or sidewalls to allow waste from the roof to slip down the inside of the shields. The vertical shrouds are to be sandwiched between two separate sections of the roof bonnet when lifted to its highest position. Overlap to be a minimum of 36 inches between the bonnet and vertical shroud.
- E. Support the containment shields by temporary braces attached to the roof and ground. Leave space to allow rigging and equipment to be used within the shields. Extend the bracing out from the structure, and secure cables to the ground by use of deadmen. Design system, bracing, deadmen, shields, etc. depending on the size of the structure, availability of space, prevailing wind forces, and local restrictions.
- F. Immediately replace/repair any damaged shrouds. Discontinue blast operations until the damaged shrouds are repaired or replaced.
- G. Use air impenetrable walls and roof with either rigid or flexible framing.
- H. Overlap all seams by 2 ft. Completely seal all seams by stitching, taping, caulking, or other sealing measures.
- I. Cost for structural reinforcement of the roof and/or any other part of the tank, to support the containment system, is incidental to exterior painting.

3.3 TANK CONNECTIONS

- A. In submittal, request approval of all welding and cutting on the structure.
- B. Cut all approved holes into the tank with rounded corners.

- C. Use a welder certified to complete the type and position weld necessary for attachment.
- D. All steel must be cleaned of lead paint by approved method before cutting or welding.

3.4 CONTAINMENT OPENINGS

- A. Design a means of ingress and egress of the containment structure. Access shall be through an overlapped door on each side of the chamber.
- B. Size of the structure shall be 8 ft. x 8 ft. x 6 ft. high. Fabricate the structure from scaffolding and cover with overlapping tarps secured in-place. Construct the chamber out of 6 ft. high scaffold sections. Install the scaffold so the majority of the scaffold is extended out from the containment. Minimum clear walking height shall be 54 in. Minimum width shall be 42 in.
- C. Fabricate the opening for exhaust air piping with a minimum 18 in. long tunnel firmly attached. Maintain the exhaust piping in as straight a line as possible to avoid restricting airflow. Exhaust air attachments may be elsewhere other than the entryway.
- D. Supply an operating HEPA vacuum in the entryway to vacuum off workers leaving the containment. Maintain the vacuum clean and serviced.

3.5 GROUND COVER

- A. Protect the ground from lead contamination. Include the area inside the containment, and a 10 ft. diameter around the outside of the containment.
- B. Lap all ground tarps a minimum of 2 ft. Lap the inside ground tarps up 2 ft. on the outside of the vertical shrouds. Lap the outside ground tarps 2 ft. under the inside tarps with slots for cables. This will prevent loss of abrasive material between the ground and vertical shrouds.

3.6 DAILY SHUTDOWN

- A. Clean all ground tarps daily. Collect all debris and store in barrels. Roll all tarps for storage, including all tarps inside containment. The purpose is to prevent the debris from being blown off the tarps.
- B. After blasting, clean all flat surfaces daily before the containment structure is lowered. Also clean all rigging and equipment before lowering containment, or removing the roof cover.

PART 4 - SPECIAL PROVISIONS

4.1 FENCING

- A. It is unlikely that containment will fit within the fenced area. Remove fencing prior to the containment installation. Construct a temporary 4 ft. safety construction fencing around entire site.
- B. Hire a local professional fencing company to reinstall the fence at completion of the project. Any sections damaged during removal or storage are to be replaced to match existing fence.
- C. Cost is incidental to exterior repainting.

4.2 AVIATION LIGHTS

- A. Relocate the existing aviation lights or install temporary lights on the roof above the containment roof bonnet.
- B. Install before the roof bonnet is in place.
- C. The lights must be operational throughout the entire containment phase of the project.
- D. Cost is incidental to exterior repainting.

- - End - -

SECTION 09 97 13.13.15
WET INTERIOR STEEL COATING - THREE COAT ZINC EPOXY

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Painting in the wet interior.

1.2 REFERENCES

- A. SSPC and NACE Standards:
1. PA1 - Paint Application.
 2. PA2 - Measurements and Calibration.
 3. NACE RP 0178 Surface Finish Requirements.

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 WORK INCLUDED

- A. Application of a three (3) coat zinc epoxy system.
- B. Application of a polyurethane elastomeric seam sealer.

PART 2 - PRODUCTS

2.1 ZINC EPOXY POLYAMIDE - 3 COAT SYSTEM - WET INTERIOR

- A. Three (3) coat zinc epoxy polyamide system meeting all National Sanitation Foundation certification standards for potable water contact.

- B. Approved suppliers and system for the riser:

<u>Manufacturer</u>	<u>System</u>
Tnemec	94H ₂ O/N140/N140(stripe)/ 22
Sherwin Williams	Corothane I/646PW/646PW(stripe)/5500

- C. Approved suppliers and system for the bowl sidewall and roof.

<u>Manufacturer</u>	<u>System</u>
Tnemec	94H ₂ O/N140/N140(stripe)/N140

Sherwin Williams Corothane I
 galvapac/646PW/646PW(stripe)/646PW

D. Approved seam sealer

Sika Corporation Sika Flex 1a

PART 3 - EXECUTION

3.1 ZINC EPOXY POLYAMIDE - 3 COAT SYSTEM - WET INTERIOR

- A. Apply a three (3) coat high build epoxy paint system to all prepared surfaces.
- B. Abrasive blast cleaning and paint requirements have been previously defined in Section 09 97 13.10.
- C. Apply each coat at the following rates for the riser:

<u>Coat</u>	Minimum	Maximum
	<u>D.F.T. (mils)</u>	<u>D.F.T. (mils)</u>
Primer	2.5	3.5
Intermediate	4.0	6.0
Stripe Coat	1.5	2.5
Topcoat	<u>16.0</u>	<u>20.0</u>
Total	22.5*	29.5*

*Total does not include stripe coat.

- D. Apply each coat at the following rates for the bowl, sidewall and roof.

<u>Coat</u>	Minimum	Maximum
	<u>D.F.T. (mils)</u>	<u>D.F.T. (mils)</u>
Primer	2.5	3.5
Intermediate	4.0	6.0
Stripe Coat	1.5	2.5
Topcoat	<u>4.0</u>	<u>6.0</u>
Total	10.5*	15.5*

*Total does not include stripe coat.

- E. Stripe coat to be applied to all welds, angles, and sharp edges throughout the structure, including above the high water line and all roof beams, etc.
- F. Each full coat to be a different color from the previous coat and is to be approved by the engineer. No color bleedthrough should occur if proper application rates are observed.

- G. Apply all coats in uniform color and sheen without streaks, laps, runs, sags, cloudy, or missed areas. Correct all defects before application of the successive coat.
- H. Allow a minimum of twenty-four (24) hours between coats (including stripe coat). Additional time may be necessary if low temperatures require an increase in the necessary cure time.
- I. MAINTAIN FORCED VENTILATION A MINIMUM OF SEVEN (7) DAYS AFTER TOPCOAT APPLICATION, time required for cure is dependent on the coating manufacturer and temperature. Record variations of the standard procedures (roof hatch closure because of rain, etc.), and submit to the engineer. Heat is required if, in the opinion of the engineer, the integrity of the coating is endangered by cold weather, or if additional cure time will delay the project beyond the substantial completion date.

3.2 SEAM SEALING - WET INTERIOR ROOF

- A. Seam seal all roof lap seams on the interior after the topcoat is dry to the touch. Seal using a caulking gun filling all cracks less than 1 in. separation. Tool sealant as required.

3.3 SCHEDULE of WORK

- A. Complete all exterior and interior welding prior to surface preparation.

- - End - -

SECTION 09 97 13.21.06
PIT PIPING STEEL COATING - TWO COAT EPOXY

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Painting the pit piping.

1.2 REFERENCES

- A. SSPC and NACE Standards:
1. PA1 - Paint Application.
 2. PA2 - Measurements and Calibration.
 3. NACE RP 0178 Surface Finish Requirements.

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
B. 01 35 26 SAFETY REQUIREMENTS
C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 WORK INCLUDED

- A. Application of a two (2) coat epoxy system.

PART 2 - PRODUCTS

2.1 EPOXY POLYAMIDE - 2 COAT SYSTEM - PIT PIPING

- A. Two (2) coat epoxy polyamide system.
- B. Approved suppliers and systems:
- | <u>Manufacturer</u> | <u>System</u> |
|---------------------|---|
| Tnemec | N140/N140 (stripe)/N140 |
| Induron | PE70/PE70 (stripe)/PE70 |
| PPG | Amerlock 2/Amerlock 2 (stripe)/Amerlock 2 |
| Sherwin Williams | 646PW/646PW (stripe)/646PW |
| Carboline | 635/635 (stripe)/635 |

PART 3 - EXECUTION

3.1 EPOXY POLYAMIDE - 2 COAT SYSTEM - PIT PIPING

- A. Apply to all prepared surfaces a two (2) coat epoxy system.

B. Surface preparation has been previously defined in Section 09 97 13.10.

C. Apply each coat at the following rates:

<u>Coat</u>	Minimum	Maximum
	<u>D.F.T. (mils)</u>	<u>D.F.T. (mils)</u>
Primer	4.0	6.0
Stripe	1.5	2.5
Topcoat	<u>4.0</u>	<u>6.0</u>
Total	8.0*	12.0*

*Totals do not include stripe coat.

D. Stripe coat to be applied to all welds, angles, and sharp edges throughout the structure.

E. Each full coat to be a different color from the previous coat and is to be approved by the engineer. No color bleedthrough should occur if proper application rates are observed.

F. Apply all coats in uniform color and sheen without streaks, laps, runs, sags, cloudy, or missed areas. Correct all defects before application of the successive coat.

G. Allow a minimum of twenty-four (24) hours between coats (including stripe coat). Additional time may be necessary if low temperatures require an increase in the necessary cure time.

3.2 SCHEDULE of WORK

A. Complete all exterior and interior welding prior to surface preparation.

- - End - -

SECTION 09 97 13.23.02
EXTERIOR STEEL COATING - FOUR COAT ZINC EPOXY URETHANE REPAINT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Painting on the exterior.

1.2 REFERENCES

A. SSPC and NACE Standards:

1. PA1 - Paint Application.
2. PA2 - Measurements and Calibration.
3. NACE RP 0178 Surface Finish Requirements.

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAININGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 WORK INCLUDED

- A. Application of a four (4) coat zinc epoxy urethane system.

PART 2 - PRODUCTS

2.1 ZINC EPOXY URETHANE - 4 COAT SYSTEM

- A. The coating shall be an epoxy urethane system.
- B. The contractor is advised to follow all rules for safety while using isocyanates.
- C. Ultraviolet protection additives mixed at factory only. There will be no tinting or addition of any material other than the manufacturer's thinners.

D. Approved suppliers and systems:

<u>Manufacturer</u>	<u>System</u>
Tnemec	90-97/66/1074/1074UV
Induron	Indurazinc MC-67/PE-70/I-6600 Plus/ I-6600 Plus
Sherwin Williams	Corothane I galvapak/646PW/ Acrolon Ultra/Acrolon Ultr Pitthane Ultra/Pitthane Ultra

PART 3 - EXECUTION

3.1 ZINC EPOXY URETHANE - 4 COAT SYSTEM

- A. Apply to all prepared surfaces and appurtenances a four (4) coat zinc epoxy urethane system.
- B. Surface preparation and paint requirements have been previously defined. Apply all coating by brush and roller. Spray application is prohibited.
- C. Apply each coat at the following rates:

<u>Coat</u>	Minimum <u>D.F.T.(mils)</u>	Maximum <u>D.T.F.(mils)</u>
Primer	2.5	3.5
Epoxy Intermediate	2.0	3.0
Urethane Intermediate	2.0	3.0
Topcoat	<u>2.0</u>	<u>3.0</u>
Total	8.5	12.5

- D. Each full coat to be a different color from the previous coat and is to be approved by the engineer. No color bleed-through should occur if proper application rates are observed.
- E. Apply all coats in uniform color and sheen without streaks, laps, runs, sags, cloudy, or missed areas. Correct all defects before application of the successive coat.
- F. Allow a minimum of twenty-four (24) hours between coats.
Additional time may be necessary if low temperatures require an increase in the necessary cure time.
- G. The contractor is advised that Dixon Engineering, Inc. will take dry film thickness readings on the exterior per SSPC-PA2 which requires gauge adjustment from magnetic plane to peak plane.

3.2 FAA MARKINGS

- A. Paint a checkered pattern on the tank to match the existing markings.
- B. Approved Fluorourethane topcoat. Contractor has the option to apply over the last urethane topcoat, or in place of the last urethane topcoat.

<u>Manufacturer</u>	<u>System</u>
Tnemec	700
Induron	Perma-Gloss
Sherwin Williams	Fluorokem HS
PPG	Coraflon ADS

- C. Apply markings coating at 2.0 to 3.0 mils.

- - End - -

SECTION 22 05 11
COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The requirements of this Section shall apply to all sections of Division 22.

B. Definitions:

1. Exposed: Piping and equipment exposed to view in finished rooms. C. Abbreviations/Acronyms:
2. ABS: Acrylonitrile Butadiene Styrene
3. AISI: American Iron and Steel Institute
4. AWG: American Wire Gauge
5. BACnet: Building Automation and Control Network
6. BSG: Borosilicate Glass Pipe
7. CDA: Copper Development Association
8. CO: Carbon Monoxide
9. COR: Contracting Officer's Representative
10. CPVC: Chlorinated Polyvinyl Chloride
11. CR: Chloroprene
12. CWP: Cold Working Pressure
13. db(A): Decibels (A weighted)
14. DDC: Direct Digital Control
15. DISS: Diameter Index Safety System
16. DWV: Drainage, Waste and Vent
17. ECC: Engineering Control Center
18. EPDM: Ethylene Propylene Diene Monomer
19. EPT: Ethylene Propylene Terpolymer
20. ETO: Ethylene Oxide
21. FAR: Federal Acquisition Regulations
22. FD: Floor Drain
23. FG: Fiberglass
24. FNPT: Female National Pipe Thread
25. FPM: Fluoroelastomer Polymer
26. HDPE: High Density Polyethylene
27. HOA: Hands-Off-Automatic
28. HP: Horsepower
29. ID: Inside Diameter
30. MAWP: Maximum Allowable Working Pressure

- 31. NPTF: National Pipe Thread Female
- 32. NPS: Nominal Pipe Size
- 33. NPT: National Pipe Thread
- 34. OD: Outside Diameter
- 35. OSD: Open Sight Drain
- 36. OS&Y: Outside Stem and Yoke
- 37. PP: Polypropylene
- 38. PTFE: Polytetrafluoroethylene
- 39. PVC: Polyvinyl Chloride
- 40. PVDF: Polyvinylidene Fluoride
- 41. RTRP: Reinforced Thermosetting Resin Pipe
- 42. SPS: Sterile Processing Services
- 43. SUS: Saybolt Universal Second
- 44. SWP: Steam Working Pressure
- 45. TFE: Tetrafluoroethylene
- 46. THHN: Thermoplastic High-Heat Resistant Nylon Coated Wire
- 47. THWN: Thermoplastic Heat & Water Resistant Nylon Coated Wire
- 48. USDA: U.S. Department of Agriculture
- 49. VAC: Voltage in Alternating Current
- 50. WOG: Water, Oil, Gas

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 01 74 19, CONSTRUCTION WASTE MANAGEMENT.
- D. Section 07 92 00, JOINT SEALANTS.
- E. Section 22 07 11, PLUMBING INSULATION.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below shall form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
 - ASME Boiler and Pressure Vessel Code -
 - BPVC Section IX-2013....Welding, Brazing, and Fusing Qualifications
 - B31.1-2012.....Power Piping
- C. American Society for Testing and Materials (ASTM):
 - A36/A36M-2012.....Standard Specification for Carbon Structural Steel
 - A575-96(R2013)e1.....Standard Specification for Steel Bars, Carbon,

Merchant Quality, M-Grades

- E84-2013a.....Standard Test Method for Surface Burning
Characteristics of Building Materials
- E119-2012a.....Standard Test Methods for Fire Tests of
Building Construction and Materials
- F1760-01 (R2011).....Standard Specification for Coextruded
Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic
Pipe Having Reprocessed-Recycled Content
- D. International Code Council, (ICC):
- IBC-2012.....International Building Code
- IPC-2012.....International Plumbing Code
- E. Manufacturers Standardization Society (MSS) of the Valve and Fittings
Industry, Inc:
- SP-58-2009.....Pipe Hangers and Supports - Materials, Design,
Manufacture, Selection, Application and
Installation
- SP-69-2003.....Pipe Hangers and Supports - Selection and
Application
- F. Military Specifications (MIL):
- P-21035B.....Paint High Zinc Dust Content, Galvanizing Repair
(Metric)
- G. National Electrical Manufacturers Association (NEMA): MG 1-
2011.....Motors and Generators
- H. National Fire Protection Association (NFPA):
- 51B-2014.....Standard for Fire Prevention During Welding,
Cutting and Other Hot Work
- 54-2012.....National Fuel Gas Code
- 70-2011.....National Electrical Code (NEC) I. NSF International
(NSF):
- 5-2012.....Water Heaters, Hot Water Supply Boilers, and
Heat Recovery Equipment
- 14-2012.....Plastic Piping System Components and Related
Materials
- 61-2012.....Drinking Water System Components - Health
Effects
- 372-2011.....Drinking Water System Components - Lead Content
- J. Department of Veterans Affairs (VA):
- PG-18-10.....Plumbing Design Manual

PG-18-13-2011.....Barrier Free Design Guide

1.4 SUBMITTALS

- A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 05 11, COMMON WORK RESULTS FOR PLUMBING", with applicable paragraph identification.
- C. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements and will fit the space available.
- D. If equipment is submitted which differs in arrangement from that shown, provide drawings that show the rearrangement of all associated systems. Approval will be given only if all features of the equipment and associated systems, including accessibility, are equivalent to that required by the contract.

1.5 QUALITY ASSURANCE

- A. Products:
 - 1. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture, supply and servicing of the specified products for at least 5 years. However, digital electronics devices, software and systems such as controls, instruments, computer work station, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least 5 years.
 - 2. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
 - 3. The products and execution of work specified in Division 22 shall conform to the referenced codes and standards as required by the specifications. Local codes and amendments enforced by the local code official shall be enforced, if required by local authorities such as the natural gas supplier. If the local codes are more stringent, then the local code shall apply. Any conflicts shall be brought to the attention of the Contracting Officers Representative (COR).
 - 4. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products

of one manufacturer.

5. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.

B. Execution (Installation, Construction) Quality:

1. All items shall be applied and installed in accordance with manufacturer's written instructions. Conflicts between the manufacturer's instructions and the contract documents shall be referred to the COR for resolution. Printed copies or electronic files of manufacturer's installation instructions shall be provided to the COR at least 10 working days prior to commencing installation of any item.
2. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration, shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include, but are not limited to: all types of valves, filters and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract documents to COR for resolution.
3. Installer Qualifications: Installer shall be licensed and shall provide evidence of the successful completion of at least five projects of equal or greater size and complexity. Provide tradesmen skilled in the appropriate trade.
4. If an installation is unsatisfactory to the COR, the Contractor shall correct the installation at no additional cost or additional time to the Government.

C. Guaranty: Warranty of Construction, FAR clause 52.246-21.

- D. Plumbing Systems: IPC, International Plumbing Code. Unless otherwise required herein, perform plumbing work in accordance with the latest version of the IPC. For IPC codes referenced in the contract documents, advisory provisions shall be considered mandatory, the word "should" shall be interpreted as "shall". Reference to the "code official" or "owner" shall be interpreted to mean the COR.

E. Cleanliness of Piping and Equipment Systems:

1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.

2. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection of Equipment:

1. Equipment and material placed on the job site shall remain in the custody of the Contractor until phased acceptance, whether or not the Government has reimbursed the Contractor for the equipment and material. The Contractor is solely responsible for the protection of such equipment and material against any damage.
2. Damaged equipment shall be replaced with an identical unit as determined and directed by the COR. Such replacement shall be at no additional cost or additional time to the Government.
3. Interiors of new equipment and piping systems shall be protected against entry of foreign matter. Both inside and outside shall be cleaned before painting or placing equipment in operation.
4. Existing equipment and piping being worked on by the Contractor shall be under the custody and responsibility of the Contractor and shall be protected as required for new work.

1.7 AS-BUILT DOCUMENTATION

- A. Submit manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
- B. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics and a written description of system design, shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations.
- C. The installing contractor shall maintain as-built drawings of each completed phase for verification; and, shall provide the complete set at the time of final systems certification testing. As-built drawings are to be provided, and a copy of them on Auto-Cad version 2014 provided on compact disk or DVD. Should the installing contractor engage the testing company to provide as-built or any portion thereof, it shall not be deemed a conflict of interest or breach of the 'third party testing company' requirement.
- D. Certification documentation shall be provided prior to submitting the request for final inspection. The documentation shall include all test

results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and a certification that all results of tests were within limits specified.

PART 2 - PRODUCTS

2.1 MATERIALS FOR VARIOUS SERVICES

- A. Material or equipment containing a weighted average of greater than .25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF 61 or NSF 372.
- B. In-line devices such as water meters, building valves, check valves, stops, valves, fittings, tanks and backflow preventers shall comply with NSF 61 and NSF 372.

2.2 FACTORY-ASSEMBLED PRODUCTS

- A. Standardization of components shall be maximized to reduce spare part requirements.
- B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.
 - 1. All components of an assembled unit need not be products of same manufacturer.
 - 2. Constituent parts that are alike shall be products of a single manufacturer.
 - 3. Components shall be compatible with each other and with the total assembly for intended service.
 - 4. Contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly at no additional cost or time to the Government.
- C. Components of equipment shall bear manufacturer's name and trademark, model number, serial number and performance data on a name plate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.
- D. Major items of equipment, which serve the same function, shall be the same make and model.

2.3 COMPATIBILITY OF RELATED EQUIPMENT

- A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that the result will be a complete and fully operational system that conforms to contract requirements.

2.4 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Use symbols, nomenclature and equipment numbers specified, shown on the drawings, or shown in the maintenance manuals. Coordinate equipment and valve identification with facility maintenance staff. In addition, provide bar code identification nameplate for all equipment which will allow the equipment identification code to be scanned into the system for maintenance and inventory tracking. Identification for piping is specified in Section 09 91 00, PAINTING.
- B. Interior (Indoor) Equipment: Engraved nameplates, with letters not less than 7 mm (3/16 inch) high of brass with black-filled letters, or rigid black plastic with white letters specified in Section 09 91 00, PAINTING shall be permanently fastened to the equipment. Unit components such as water heaters, tanks, coils, filters, etc. shall be identified.
- C. NOT USED
- D. Control Items: All temperature, pressure, and controllers shall be labeled and the component's function identified. Identify and label each item as they appear on the control diagrams.
- E. Valve Tags and Lists:
 - 1. Plumbing: All valves shall be provided with valve tags and listed on a valve list (Fixture stops not included).
 - 2. Valve tags: Engraved black filled numbers and letters not less than 15 mm (1/2 inch) high for number designation, and not less than 8 mm (1/4 inch) for service designation on 19 gage, 40 mm (1-1/2 inches) round brass disc, attached with brass "S" hook or brass chain.
 - 3. Valve lists: Valve lists shall be created using a word processing program and printed on plastic coated cards. The plastic coated valve list card(s), sized 215 mm (8-1/2 inches) by 275 mm (11 inches) shall show valve tag number, valve function and area of control for each service or system. The valve list shall be in a punched 3-ring binder notebook. An additional copy of the valve list shall be mounted in picture frames for mounting to a wall. COR shall instruct contractor where frames shall be mounted.

4. A detailed plan for each floor of the building indicating the location and valve number for each valve shall be provided in the 3-ring binder notebook. Each valve location shall be identified with a color coded sticker or thumb tack in ceiling or access door.

2.6 PIPE AND EQUIPMENT SUPPORTS AND RESTRAINTS

- A. For Attachment to Concrete Construction:
 1. Concrete insert: Type 18, MSS SP-58.
 2. Self-drilling expansion shields and machine bolt expansion anchors: Permitted in concrete not less than 100 mm (4 inches) thick when approved by the COR for each job condition.
 3. Power-driven fasteners: Permitted in existing concrete or masonry not less than 100 mm (4 inches) thick when approved by the COR for each job condition.

2.7 PIPE PENETRATIONS

- A. Pipe penetration sleeves shall be installed for all pipe other than rectangular blocked out floor openings for risers in mechanical bays.
- B. Pipe penetration sleeve materials shall comply with all firestopping requirements for each penetration.
- C. For drilled penetrations: Provide pipe sleeve set in silicone adhesive around penetration.
- D. Galvanized steel or an alternate black iron pipe with asphalt coating sleeves shall be for pipe passing through masonry walls.
- E. Sleeve clearance through floors, walls, partitions, and beam flanges shall be 25 mm (1 inch) greater in diameter than external diameter of pipe. Interior openings shall be caulked tight with firestopping material and sealant to prevent the spread of fire, smoke, water and gases.
- F. Sealant and Adhesives: Shall be as specified in Section 07 92 00, JOINT SEALANTS

2.15 ASBESTOS

- A. Materials containing asbestos are not permitted.

PART 3 - EXECUTION

3.1 ARRANGEMENT AND INSTALLATION OF EQUIPMENT AND PIPING

- A. Location of piping, sleeves, inserts, hangers, and equipment, access provisions shall be coordinated with the work of all trades. Piping,

sleeves, inserts, hangers, and equipment shall be located clear of windows, doors, openings, light outlets, and other services and utilities. Equipment layout drawings shall be prepared to coordinate proper location and personnel access of all facilities. The drawings shall be submitted for review.

B. Manufacturer's published recommendations shall be followed for installation methods not otherwise specified.

C. Location of pipe sleeves and trenches shall be accurately coordinated with equipment and piping locations.

D. Cutting Holes:

1. Holes shall be located to avoid interference with structural members such as beams or grade beams. Holes shall be laid out in advance and drilling done only after approval by COR. If the Contractor considers it necessary to drill through structural members, this matter shall be referred to COR for approval.

2. Holes through concrete and masonry shall be cut by rotary core drill. Pneumatic hammer, impact electric, and hand or manual hammer type drill will not be allowed, except as permitted by COR where working area space is limited.

I. Protection and Cleaning:

1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the COR. Damaged or defective items in the opinion of the COR, shall be replaced at no additional cost or time to the Government.

- - E N D - -

SECTION 22 07 11
PLUMBING INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Field applied insulation for thermal efficiency for the water monitoring sample water lines:
- B. Definitions:
 - 1. ASJ: All Service Jacket, Kraft paper, white finish facing or jacket.
 - 2. Air conditioned space: Space having air temperature and/or humidity controlled by mechanical equipment.
 - 3. All insulation systems installed within supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces, interiors of air conditioned or heating ducts, and mechanical equipment rooms shall be noncombustible or shall be listed and labeled as having a flame spread indexes of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723. Note: ICC IMC, Section 602.2.1.
 - 4. Cold: Equipment or piping handling media at design temperature of 15 degrees C (60 degrees F) or below.
 - 5. Concealed: Piping above ceilings and in chases, interstitial space, and pipe spaces.
 - 6. Exposed: Piping and equipment exposed to view in finished areas including mechanical equipment rooms or exposed to outdoor weather. Shafts, chases, //interstitial spaces, // unfinished attics, crawl spaces and pipe basements are not considered finished areas.
 - 7. FSK: Foil-scrim-Kraft facing.
 - 8. Hot: Plumbing equipment or piping handling media above 40 degrees C (104 degrees F).
 - 9. Density: kg/m^3 - kilograms per cubic meter (Pcf - pounds per cubic foot).
 - 10. Thermal conductance: Heat flow rate through materials.
 - a. Flat surface: Watts per square meter (BTU per hour per square foot).
 - b. Pipe or Cylinder: Watts per linear meter (BTU per hour per linear foot) for a given outside diameter.
 - 11. Thermal Conductivity (k): Watts per meter, per degree K (BTU - inch thickness, per hour, per square foot, per degree F temperature

difference).

12. Vapor Retarder (Vapor Barrier): A material which retards the transmission (migration) of water vapor. Performance of the vapor retarder is rated in terms of permeance (perms). For the purpose of this specification, vapor retarders/vapor barriers shall have a maximum published permeance of .02 perms.
13. HWR: Hot water recirculating.
14. CW: Cold water.
15. SW: Soft water.
16. HW: Hot water.
17. PVDC: Polyvinylidene chloride vapor retarder jacketing, white.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING
- D. SECTION 22 11 00 FACILITY WATER DISTRIBUTION

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - B209-2014.....Standard Specification for Aluminum and
Aluminum-Alloy Sheet and Plate
 - C411-2011.....Standard Test Method for Hot-Surface
Performance of High-Temperature Thermal
Insulation
 - C449-2007 (R2013).....Standard Specification for Mineral Fiber
Hydraulic-Setting Thermal Insulating and
Finishing Cement
 - C450-2008 (R2014).....Standard Practice for Fabrication of Thermal
Insulating Fitting Covers for NPS Piping, and
Vessel Lagging
 - Adjunct to C450.....Compilation of Tables that Provide Recommended
Dimensions for Prefab and Field Thermal Insulating
Covers, etc.
 - C533-2013.....Standard Specification for Calcium Silicate
Block and Pipe Thermal Insulation
 - C534/C534M-2014.....Standard Specification for Preformed Flexible

Elastomeric Cellular Thermal Insulation in Sheet
and Tubular Form

- C547-2015.....Standard Specification for Mineral Fiber Pipe
Insulation
- C552-2014.....Standard Specification for Cellular Glass
Thermal Insulation
- C553-2013.....Standard Specification for Mineral Fiber Blanket
Thermal Insulation for Commercial and Industrial
Applications
- C591-2013.....Standard Specification for Unfaced Preformed
Rigid Cellular Polyisocyanurate Thermal
Insulation
- C680-2014.....Standard Practice for Estimate of the Heat Gain or
Loss and the Surface Temperatures of Insulated
Flat, Cylindrical, and Spherical Systems by Use of
Computer Programs
- C612-2014.....Standard Specification for Mineral Fiber Block and
Board Thermal Insulation
- C1126-2014.....Standard Specification for Faced or Unfaced
Rigid Cellular Phenolic Thermal Insulation
- C1136-2012.....Standard Specification for Flexible, Low
Permeance Vapor Retarders for Thermal
Insulation
- C1710-2011.....Standard Guide for Installation of Flexible Closed
Cell Preformed Insulation in Tube and Sheet Form
- D1668/D1668M-1997a (2014)e1 Standard Specification for Glass Fabrics (Woven
and Treated) for Roofing and Waterproofing
- E84-2015a.....Standard Test Method for Surface Burning
Characteristics of Building Materials
- E2231-2015.....Standard Practice for Specimen Preparation and Mounting
of Pipe and Duct Insulation to Assess Surface Burning
Characteristics
- C. Federal Specifications (Fed. Spec.):
- L-P-535E-1979.....Plastic Sheet (Sheeting): Plastic Strip; Poly (Vinyl
Chloride) and Poly (Vinyl Chloride - Vinyl Acetate),
Rigid.
- D. International Code Council, (ICC):
- IMC-2012.....International Mechanical Code

E. Military Specifications (Mil. Spec.):

MIL-A-3316C (2)-1990....Adhesives, Fire-Resistant, Thermal Insulation

MIL-A-24179A (2)-1987...Adhesive, Flexible Unicellular-Plastic Thermal
Insulation

MIL-PRF-19565C (1)-1988.Coating Compounds, Thermal Insulation, Fire-and
Water-Resistant, Vapor-Barrier

MIL-C-20079H-1987.....Cloth, Glass; Tape, Textile Glass; and Thread, Glass
and Wire-Reinforced Glass

F. National Fire Protection Association (NFPA):

90A-2015.....Standard for the Installation of Air-
Conditioning and Ventilating Systems

G. Underwriters Laboratories, Inc (UL):

723-2008 (R2013).....Standard for Test for Surface Burning
Characteristics of Building Materials

1887-2004 (R2013).....Standard for Fire Test of Plastic Sprinkler
Pipe for Visible Flame and Smoke
Characteristics

H. 3E Plus® version 4.1 Insulation Thickness Computer Program: Available
from NAIMA with free download; <http://www.pipeinsulation.net>

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in
accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND
SAMPLES.

B. Information and material submitted under this section shall be marked
"SUBMITTED UNDER SECTION 22 07 11, PLUMBING INSULATION", with applicable
paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and
accessories. Include dimensions, weights, materials, applications, standard
compliance, model numbers, and size.

1.5 QUALITY ASSURANCE

A. Refer to article QUALITY ASSURANCE, in Section 22 05 11, COMMON WORK
RESULTS FOR PLUMBING.

B. Criteria:

1. Comply with NFPA 90A.

2. Test methods: ASTM E84, UL 723, and ASTM E2231.

3. Specified k factors are at 24 degrees C (75 degrees F) mean temperature
unless stated otherwise. Where optional thermal insulation material is

used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.

4. All materials shall be compatible and suitable for service temperature, and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.
- C. Every package or standard container of insulation or accessories delivered to the job site for use shall have a manufacturer's stamp or label giving the name of the manufacturer, description of the material, and the production date or code.
- D. Bio-Based Materials: For products designated by the USDA's Bio-Preferred Program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specifications section. For more information regarding the product categories covered by the Bio-Preferred Program, visit <http://www.biopreferred.gov>.

1.6 AS-BUILT DOCUMENTATION

- A. Submit manufacturer's literature and data updated to include submittal review comments.

1.7 STORAGE AND HANDLING OF MATERIAL

- A. Store materials in clean and dry environment, pipe insulation jackets shall be clean and unmarred. Place adhesives in original containers. Maintain ambient temperatures and conditions as required by printed instructions of manufacturers of adhesives, mastics and finishing cements.

PART 2 - PRODUCTS

2.1 RIGID CELLULAR PHENOLIC FOAM

- A. Preformed (molded) pipe insulation, ASTM C1126, Type III, grade 1, $k = 0.021(0.15)$ at 10 degrees C (50 degrees F), for use at temperatures up to 121 degrees C (250 degrees F) with vapor retarder and all service vapor retarder jacket (ASJ) and with PVC premolded fitting covering.

2.2 FLAME AND SMOKE

- A. Unless shown otherwise all assembled systems shall meet flame spread 25 and smoke developed 50 rating as developed under ASTM and UL standards and specifications. See paragraph "Quality Assurance".

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Required pressure tests of piping joints and connections shall be completed and the work approved by the COR for application of insulation. Surface shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.
- B. Insulate all specified equipment, and piping (pipe, fittings, valves, accessories). Insulate each pipe individually. Do not use scrap pieces of insulation where a full length section will fit.
- C. Insulation materials shall be installed with smooth and even surfaces, sealed at all laps. Insulation shall be continuous through all sleeves and openings.
- D. Plumbing work not to be insulated unless otherwise noted:
 - 1. Water piping in contact with earth.
- E. Apply insulation materials subject to the manufacturers recommended temperature limits. Apply adhesives, mastic and coatings at the manufacturer's recommended minimum wet or dry film thickness. Bio-based materials shall be utilized when possible.
- F. Elbows, flanges and other fittings shall be insulated with the same material as is used on the pipe straights. Use of polyurethane or polyisocyanurate spray-foam to fill a PVC elbow jacket is prohibited on cold applications.

3.2 INSULATION INSTALLATION

- A. Rigid Cellular Phenolic Foam:
 - 1. Rigid closed cell phenolic insulation may be provided, exterior only, for piping, ductwork and equipment for temperatures up to 121 degrees C (250 degrees F).
 - 2. Note the ASTM E84 or UL 723 surface burning characteristics requirements of maximum 25/50 indexes in paragraph "Quality Assurance".
 - 3. Apply insulation with joints tightly drawn together.
 - 4. Apply adhesives, coverings, neatly finished at fittings, and valves.
 - 5. Final installation shall be smooth, tight, neatly finished at all edges.
 - 7. Minimum thickness of 1 inch.

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SECTION 22 11 00
FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Domestic water systems, including piping, equipment and all necessary accessories as designated in this section.
- B. A complete listing of all acronyms and abbreviations are included in Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS.
- B. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- C. Section 07 92 00, JOINT SEALANTS.
- D. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
- E. Section 22 07 11, PLUMBING INSULATION.

1.3 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society of Mechanical Engineers (ASME):
 - A13.1-2007 (R2013).....Scheme for Identification of Piping Systems
 - B16.3-2011.....Malleable Iron Threaded Fittings: Classes 150 and 300
 - B16.9-2012.....Factory-Made Wrought Buttwelding Fittings B16.11-2011.....Forged Fittings, Socket-Welding and Threaded
 - B16.12-2009 (R2014).....Cast Iron Threaded Drainage Fittings
 - B16.15-2013Cast Copper Alloy Threaded Fittings: Classes 125 and 250
 - B16.18-2012.....Cast Copper Alloy Solder Joint Pressure Fittings
 - B16.22-2013.....Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
 - B16.24-2011.....Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500
 - B16.51-2013.....Copper and Copper Alloy Press-Connect Fittings
 - ASME Boiler and Pressure Vessel Code -
 - BPVC Section IX-2015....Welding, Brazing, and Fusing Qualifications
- C. American Society of Sanitary Engineers (ASSE):
 - 1010-2004.....Performance Requirements for Water Hammer

Arresters

D. American Society for Testing and Materials (ASTM):

A47/A47M-1999 (R2014)...Standard Specification for Ferritic Malleable
Iron Castings

A53/A53M-2012.....Standard Specification for Pipe, Steel, Black
and Hot-Dipped, Zinc-Coated, Welded and Seamless

A183-2014.....Standard Specification for Carbon Steel Track
Bolts and Nuts

A269/A269M-2014e1.....Standard Specification for Seamless and Welded
Austenitic Stainless Steel Tubing for General
Service

A312/A312M-2015.....Standard Specification for Seamless, Welded,
and Heavily Cold Worked Austenitic Stainless
Steel Pipes

A403/A403M-2014.....Standard Specification for Wrought Austenitic
Stainless Steel Piping Fittings

A536-1984 (R2014).....Standard Specification for Ductile Iron
Castings

A733-2013.....Standard Specification for Welded and Seamless
Carbon Steel and Austenitic Stainless Steel Pipe
Nipples

B32-2008 (R2014).....Standard Specification for Solder Metal

B43-2014.....Standard Specification for Seamless Red Brass
Pipe, Standard Sizes

B61-2008 (R2013).....Standard Specification for Steam or Valve
Bronze Castings

B62-2009.....Standard Specification for Composition Bronze
or Ounce Metal Castings

B75/B75M-2011.....Standard Specification for Seamless Copper Tube

B88-2014.....Standard Specification for Seamless Copper
Water Tube

B584-2014.....Standard Specification for Copper Alloy Sand
Castings for General Applications

B687-1999 (R2011).....Standard Specification for Brass, Copper, and
Chromium-Plated Pipe Nipples

C919-2012.....Standard Practice for Use of Sealants in
Acoustical Applications

D1785-2012.....Standard Specification for Poly (Vinyl

Chloride) (PVC) Plastic Pipe, Schedules 40, 80,
and 120

D2000-2012.....Standard Classification System for Rubber
Products in Automotive Applications

D2564-2012.....Standard Specification for Solvent Cements for
Poly (Vinyl Chloride) (PVC) Plastic Piping Systems

D2657-2007.....Standard Practice for Heat Fusion Joining of
Polyolefin Pipe and Fittings

D2855-1996 (R2010).....Standard Practice for Making Solvent-Cemented
Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

D4101-2014.....Standard Specification for Polypropylene
Injection and Extrusion Materials

E1120-2008.....Standard Specification for Liquid Chlorine

E1229-2008.....Standard Specification for Calcium Hypochlorite

F2389-2010.....Standard Specification for Pressure-rated
Polypropylene (PP) Piping Systems

F2620-2013.....Standard Practice for Heat Fusion Joining of
Polyethylene Pipe and Fittings

F2769-2014.....Standard Specification for Polyethylene of
Raised Temperature (PE-RT) Plastic Hot and
Cold-Water Tubing and Distribution Systems

E. American Water Works Association (AWWA):

C110-2012.....Ductile-Iron and Gray-Iron Fittings

C151-2009.....Ductile Iron Pipe, Centrifugally Cast

C153-2011.....Ductile-Iron Compact Fittings

C203-2008.....Coal-Tar Protective Coatings and Linings for
Steel Water Pipelines - Enamel and Tape - Hot
Applied

C213-2007.....Fusion-Bonded Epoxy Coating for the Interior
and Exterior of Steel Water Pipelines

C651-2014.....Disinfecting Water Mains

F. American Welding Society (AWS):

A5.8M/A5.8-2011-AMD1....Specification for Filler Metals for Brazing and
Braze Welding

G. International Code Council (ICC):

IPC-2012.....International Plumbing Code

H. Manufacturers Specification Society (MSS):

SP-58-2009.....Pipe Hangers and Supports - Materials, Design,
Manufacture, Selection, Application, and

Installation

SP-72-2010a.....Ball Valves with Flanged or Butt-Welding Ends
for General Service

SP-110-2010.....Ball Valves Threaded, Socket-Welding, Solder
Joint, Grooved and Flared Ends

14-2015.....Plastics Piping System Components and Related
Materials

61-2014a.....Drinking Water System Components - Health
Effects

372-2011.....Drinking Water System Components - Lead Content

J. Plumbing and Drainage Institute (PDI):

PDI-WH 201-2010.....Water Hammer Arrestors

K. Department of Veterans Affairs:

H-18-8-2013.....Seismic Design Handbook

1.4 SUBMITTALS

A. Submittals, including number of required copies, shall be submitted in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Information and material submitted under this section shall be marked "SUBMITTED UNDER SECTION 22 11 00, FACILITY WATER DISTRIBUTIONS", with applicable paragraph identification.

C. Manufacturer's Literature and Data including: Full item description and optional features and accessories. Include dimensions, weights, materials, applications, standard compliance, model numbers, size, and capacity.

1. All items listed in Part 2 - Products.

D. Complete operating and maintenance manuals including, technical data sheets and information for ordering replacement parts:

1. Include complete list indicating all components of the systems.

1.5 QUALITY ASSURANCE

A. All joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer.

B. All pipe, couplings, fittings, and specialties shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

1.6 SPARE PARTS

A. For mechanical press-connect fittings, provide tools required for each pipe size used at the facility.

1.7 AS-BUILT DOCUMENTATION

- A. Submit operation and maintenance data updated to include submittal review comments, substitutions and construction revisions shall be in electronic version on compact disc or DVD inserted into a three ring binder. All aspects of system operation and maintenance procedures, including piping isometrics and a written description of system components/design, shall be included in the operation and maintenance manual. The operations and maintenance manual shall include troubleshooting techniques and procedures for emergency situations.
- B. The installing contractor shall maintain as-built drawings, and provide the complete set at the conclusion of the project. As-built drawings are to be provided, and a copy of them in Auto-CAD provided on compact disk or DVD.
- C. Certification documentation shall be provided to COR 10 working days prior to submitting the request for final inspection. The documentation shall include all test results, the names of individuals performing work for the testing agency on this project, detailed procedures followed for all tests, and certificate if applicable that all results of tests were within limits specified. If a certificate is not available, all documentation shall be on the Certifier's letterhead.

PART 2 - PRODUCTS

2.1 ABOVE GROUND (INTERIOR) WATER PIPING

- A. Pipe: Copper tube, ASTM B88, Type K drawn.
- B. Fittings for Copper Tube:
 - 1. Wrought copper or bronze castings conforming to ASME B16.18 and B16.22. Unions shall be bronze, MSS SP-72, MSS SP-110, solder or braze joints. Use 95/5 tin and antimony for all soldered joints.
 - 2. Mechanical press-connect fittings for copper pipe and tube shall conform to the material and sizing requirements of ASME B16.51, NSF 61 approved, 50 mm (2 inch) size and smaller mechanical press-connect fittings, double pressed type, with EPDM (ethylene propylene diene monomer) non-toxic synthetic rubber sealing elements and unpressed fitting identification feature.
 - 3. Mechanically formed tee connection: Form mechanically extracted collars in a continuous operation by drilling pilot hole and drawing out tube surface to form collar, having a height of not less than three times the thickness of tube wall. Adjustable collaring device shall ensure proper tolerance and complete uniformity of the joint. Notch and dimple joining branch tube in a single process to provide

free flow where the branch tube penetrates the fitting. Braze joints.

4. Flanged fittings, bronze, class 150, solder-joint ends conforming to ASME B16.24.

D. Adapters: Provide adapters for joining pipe or tubing with dissimilar end connections.

E. Solder: ASTM B32 alloy type Sb5, HA or HB. Provide non-corrosive flux.

2.2 EXPOSED WATER PIPING

A. Finished Room: Use full iron pipe size chrome plated brass piping for exposed water piping connecting fixtures, casework, cabinets, equipment and reagent racks when not concealed by apron including those furnished by the Government or specified in other sections.

1. Pipe: ASTM B43, standard weight.
2. Fittings: ASME B16.15 cast bronze threaded fittings with chrome finish.
3. Nipples: ASTM B687, Chromium-plated.
4. Unions: MSS SP-72, MSS SP-110, brass or bronze with chrome finish. Unions 65 mm (2-1/2 inches) and larger shall be flange type with approved gaskets.

2.8 DIELECTRIC FITTINGS

A. Where required provide dielectric couplings or unions between pipe of dissimilar metals.

2.9 STERILIZATION CHEMICALS

- A. Hypochlorite: ASTM E1120.
- B. Liquid Chlorine: ASTM E1229.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with the International Plumbing Code and the following:

1. Install branch piping for water from the piping system and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.
2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, except for plastic and glass, shall be reamed to remove burrs and a clean smooth finish restored to full pipe inside diameter.
3. All pipe runs shall be laid out to avoid interference with other work/trades.

8. Mechanical press-connect fitting connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. Ensure the tube is completely inserted to the fitting stop (appropriate depth) and squared with the fitting prior to applying the pressing jaws onto the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer. Minimum distance between fittings shall be in accordance with the manufacturer's requirements. When the pressing cycle is complete, visually inspect the joint to ensure the tube has remained fully inserted, as evidenced by the visible insertion mark.

B. Domestic Water piping shall conform to the following:

1. Grade all lines to facilitate drainage

3.2 TESTS

A. General: Test system either in its entirety or in sections. Submit testing plan to COR 10 working days prior to test date.

3.3 STERILIZATION

A. After tests have been successfully completed, thoroughly flush and sterilize the interior domestic water distribution system in accordance with AWWA C651.

B. Use liquid chlorine or hypochlorite for sterilization.

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SECTION 26 42 22
IMPRESSED CURRENT CATHODIC PROTECTION for TANKS with WET RISERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. SCOPE: Furnish and install a complete automatic controlled impressed current cathodic protection system to prevent corrosion on the submerged interior surfaces of the water storage tank. The tank has a wet riser. All work and material are to meet the standards established in AWWA D104-11-Automatically Controlled Impressed-Current Cathodic Protection for the Interior of Steel Water Tanks.
- B. CONFLICTS: Requirements contained in these specifications apply to and govern the work under this section. All federal government and VA requirements contained in other sections of this specification apply. This Technical Specification is intended to expand the requirements of any other specifications and is not intended to conflict or override any items unless specifically indicated. If a conflict is noted with any aspect of these specifications the COR is to be notified prior to proceeding with any aspect of the project.

1.2 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.3 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.4 QUALIFICATIONS of CATHODIC PROTECTION MANUFACTURER

- A. The Contractor is to have a minimum of five (5) continuous years of successful experience in the manufacture, installation and servicing of automatic cathodic protection systems for water storage tanks. The Contractor is to have a permanent service organization located within three hundred (300) miles of the tank

location. The contractor (manufacturer) is to have a minimum of twenty-five (25) successful units installed in water storage tanks. The manufacturer and/or his subcontractor must own and maintain or lease the equipment necessary for installation and have proper training in regard to the safety requirements.

- B. New firms may also bid this project; however, they will be subjected to thorough review based on individual experiences of staff, proof of the continuation with firm (i.e. stock ownership, etc.) and financial stability of the firm. Essentially, they will be required to provide sufficient documentation to convince the owner they will be available throughout the ten (10) years to service the system, if needed.

1.5 SHOP DRAWINGS

- A. Comply with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Submit detailed shop drawings for all items specified.
- B. Submit three (3) sets of Operation/Maintenance Manuals directly to the owner.

1.6 GUARANTEE

- A. Guarantee the cathodic protection system against all defects in materials and workmanship and further guarantee to prevent corrosion, when maintained in a continuous operation in accordance with the contractor's instructions, as evidence by the absence of pitting (or additional pitting) below the high waterline in the tank for a period of one (1) year. The requirement of a maintenance contract may be beneficial, but cannot be made a precondition to this warranty. In the event corrosion is not prevented, the contractor is to readjust, repair, or replace the system. Guarantee the reference anodes for five (5) years. It is the intention of the owner to inspect the tank, as necessary, to review the performance of the cathodic protection system.

1.7 DESIGN and PERFORMANCE REQUIREMENTS

- A. DESIGN CRITERIA:
 - 1. The tank is a 300,000 gallon elevated water storage tank. It is 106.8 ft. to bottom of the tank.
 - 2. The tank contains a wet riser which is to be protected by separate circuits and separate automatically controlled units.

Each circuit is to consist of separate transformers, rectifiers, and controls.

3. Design tank-to-water potential is to be -900 mv with units capable of adjustment from -850 mv to -1050 mv. The design potential is to be IR drop-free (type A) and based on a copper/copper sulfate reference anode.
 4. Minimum current density is to be 0.5 MA/sq. ft. of the bare surface area.
 5. The minimum design anode system life is to be ten (10) years.
- B. The intent of these specifications is to procure a quality product by an established manufacturer of the latest design. The cost of the equipment is to include all royalty costs arising from patents and licenses associated with furnishing the specified equipment. Design all material to withstand the stresses created under ice conditions. Use the latest state-of-the-art "permanent" system which is designed to be ice-free and designed for use in tanks with ice conditions. Use corrosion resistant materials for all equipment, or protect with corrosion resistant industrial coating approved by the engineer.

PART 2 - PRODUCTS

2.1 CATHODIC PROTECTION SYSTEM

- A. Provide a cathodic protection system (ice-free) which is to be the suspended or floating ring-type system. Use a separate circuit to continuously protect the riser. Furnish all items, as necessary, for the complete operating system.

2.2 MATERIALS

- A. Furnish materials for the best quality, regularly used in commercial practice, and conforming to the following specifications.
Specifically design the cathodic protection system for operation in icing conditions and protect against damage from ice.
- B. Supply only material for use inside the wet interior (i.e. all material in contact with water that meets NSF 61 Standards and bears the NSF or UL label verifying compliance).
- C. Mount the power unit as directed in Part 3 - Execution in a stainless steel, waterproof cabinet suitable for outdoor use, adequately ventilated with stainless steel screens, and with

provision for locking. Secure cabinet by using mounting brackets. If mounted on steel panel, electrically isolate from steel with non-conductive insulator.

- D. Use an electrical insulating material having suitable thickness and mechanical strength for the mounting board. Mount accurate D.C. meters with a D.C. voltmeter on the panel board for indicating output of rectifier. Supply a separate ammeter for each D.C. circuit; one circuit for the riser, and a separate circuit for the tank.
- E. Include a potential indicating voltmeter on the panel board. This voltmeter is to be part of the sensing circuit, and is to continuously indicate the structure potential value which the control system is maintaining.
- F. Panel Board is to contain the following equipment:
 - 1. Power Unit: The power unit is to have the necessary circuit breakers, transformer, selenium or silicon rectifying elements, voltmeter(s), ammeter(s), lightning, surge, overload protection, wiring and appurtenances of adequate capacity to meet the requirements established by the Engineering Survey for each corrosion problem. Provide a power unit with voltage adjustments to regulate the current required for corrosion control. The unit is to be adjustable over the entire range of 0-100% of rated capacity. Design the power unit for Single Phase, 60 Hz, 110-120 volt A.C. rated to operate at an ambient temperature of 45° Centigrade. Include a circuit breaker for the A.C. and an overload relay in the D.C. circuit. The entire power unit is to be fully field serviceable. The overall efficiency of the power unit is to exceed 65%, and the power factor is to exceed 90% of full load and rated voltage to the power unit, in the conversion of A.C. to D.C. The power factor is to be greater than 85% at outputs exceeding 25% of the rated capacity.
 - 2. Automatic Controller: House the controller integrally with the rectifier unit. The automatic controller is to be completely solid state design having no moving parts and capable of automatically maintaining the tank-to-water potential at (-)900 millivolts with respect to a copper-copper sulphate reference

electrode within an accuracy of 25 millivolts. The tank-to-water potential measured and maintained by the controller it to be free of "IR" drop error (Type A).

3. Rectifier: Use non-aging tri-amp selenium or silicon rectifiers of the approved selenium type, as manufactured by General Instrument Corporations or equal for rectifier stacks. The rectifier stacks are to have adequate cooling fins so their normal temperature rise at rated capacity will not exceed that specified by the N.E.M.A. and by the manufacturer of the rectifier stacks for cathodic protection service. Use air-cooled rectifier stacks. Design the transformer for use in cathodic protection rectifiers having separate primary and secondary copper windings. The rectifiers are to be capable of automatically adjusting output to maintain potential within +/- 25mv of -900mv, and to be adjustable over 0-100% of its rated capacity.
4. Tank-to-Water Potential Meter: Equip the controller with a calibrated potential monitoring and display circuit having integral impedance exceeding 1000 megohms which is to be so connected to read from the system reference cell the tank-to-water potential being maintained by the cathodic protection system. This voltage reading is to be free of "IR" drop error.
NOTE: If digital readout is provided, provide access to all readings required above.
- G. Run positive wires from the power unit to the anode circuits in rigid steel conduits, as established by the National Electrical Code for the allowable current-carrying capacity. Use rigid, galvanized steel conduit. Use state code for underground wire. Use HMWPE (High Moly) wire from the rectifier to and in the tank.
- H. The owner will provide 115 volt, 60 Hz, single phase power to the tank, unless specified as the contractor's responsibility elsewhere in these specifications. Connection to the panel board and rectifier unit is the responsibility of the contractor.
- I. Equip the system with copper-copper sulfate reference electrode designed for a minimum five (5) year life. Install two (2) electrodes on opposite sides of the bowl and two separate electrodes in the riser for that separate circuit (one at the top

and one approximately 5 ft. off the riser floor). If either electrode fails within five (5) years, replace as often as necessary, free of charge to the owner.

- J. Design the anode system for a minimum life of ten (10) years and securely attach to the tank to prevent damage from ice conditions. Include all labor and material for installation of the anodes, and use submerged floating anodes. The anode system uses mixed metal oxide wire anodes. Attach the anodes to a buoyant submerged structure which is maintained in a totally submerged condition, down to the minimum water level by flexible attachment to the interior tank walls or access tube. Anode and reference electrode lead wires are to enter the tank below the minimum water level through pressure-tight fittings. Use 3,000 lb. couplings for fitting. Use a separate cord to encircle the supporting cord approximately 8 in. greater radius and design the cord to relieve tension in the loading. Use $\frac{5}{16}$ in. polyester or nylon rope.
- K. Control the wet riser anode with a separate circuit. Use a single strand of platinized niobium wire with a minimum diameter of 0.062 in. with 25 micro in. of platinum. Attach the wire to a support rope every 10 ft. minimum, or as necessary. Design the system for uniform distribution of current.
- L. Protect all units using lightning arresters, surge protectors, and automatic overload protection in all modes and comply with all FCC regulations. All patent requirements are the responsibility of the contractor.
- M. Install $\frac{5}{8}$ in. diameter copper clad grounding rod to a depth of 10 ft. at base of panel. Attach rod with grounding clamp to #6 solid copper wire. Attach ground wire to rectifier.

2.3 ALARM and TELEMETRY CONTROLS

- A. The alarm and telemetry circuits are to be a secondary system designed to read controls and not to interfere in any manner with the primary controls. Use four-to-twenty (4-20) milliamp sensors to read voltage, amperage and potential of both circuits. One alarm light shall be furnished on the cover of the rectifier box. The light shall be activated by a change in amperage, voltage or potential that would signal a possible system failure.

PART 3 - EXECUTION

3.1 REMOVAL OF THE EXISTING CATHODIC SYSTEM

- A. Remove the existing cathodic protection system including the old mounting brackets, clips and all wiring, anodes and floats, etc.
- B. Any remaining lugs or clips to be removed and ground flush with the surrounding metal. Any metal gouged during removal is to be rebuilt up to the existing plate thickness.
- C. All torching, cutting and grinding is to be performed before any surface preparation or coating is started.
- D. All removed items to become the property of the contractor for proper disposal.
- E. Removal of the existing system or left over parts of the old system is to be performed by the general contractor not the sub-contractor.

3.2 INSTALLATION

- A. The cathodic protection system is to be installed by full-time employees of the supplier of the system who are specifically trained to install and service water tank cathodic protection systems. Subcontractors who are specialized tank personnel may install the cathodic protection system under direct, on-site supervision by a responsible employee of the manufacturer.
- B. Install clips, pressure fittings, mounting supports, and brackets prior to abrasive blasting.

3.3 WELDING

- A. Complete welding of attachment clips by a certified welder and use $\frac{1}{4}$ in. fillet welds all around. No area may be left which would be susceptible to crevice corrosion.
- B. Weld the pressure fitting with $\frac{1}{4}$ in. fillet continuous welds all around on both the tank's wet interior and exterior.
- C. Weld a control panel mounting bracket in-place with $\frac{1}{4}$ in. continuous fillet weld, as designated by the owner and engineer. (For tanks where the panel is to be attached to the tank rather than on the mounting panel.)
- D. Supply cathodic clips and couplings with location information.

3.4 INSTRUCTIONS

- A. After installation is complete, energize the system and adjust for optimum operations. After the unit is adjusted, take tank-to-water potential measurements using a copper-copper sulfate reference

electrode. Submit a report to the engineer, including all the test results obtained.

- B. After supervision of inspection and start-up operations, provide one (1) additional day for training of the owner and/or his representative. The training is to include minor troubleshooting practices, recordkeeping, and methods used to determine the effectiveness of the system. The training period is at the owner's discretion within one (1) year of start-up.

3.5 MOUNTING PANEL

- A. Construct a mounting panel for the power unit. Use 2-8 ft. long, 2½ in. Schedule 40 galvanized steel pipe supports with threaded end caps.
- B. Dig 2-8 in. holes 3 ft. down and 3 ft. on center, lay a prefabricated concrete base pad or a layer of concrete a minimum of 2 inches deep into the bottom of each hole and allow the concrete to harden. Set pipes into the ground and pour remaining concrete into the hole.
- C. Pour a 3 ft. by 4 ft. concrete pad 3.5 inches deep around the control panel. Pad top to be level with the surrounding ground.
- D. Use ultraviolet protected plastic deck boards for the panel. Panel to consist of four (4) boards for the panel spaced ½ in apart. Attach to the pipes using 3/8 in. galvanized u-bolts, 4 per board.

3.6 OPERATION of SYSTEM

- A. The owner reserves the right to leave the cathodic protection system out-of-service for one full year.
- B. Complete item 3.03 - Instructions when scheduled by the owner (within 13 months).
- C. Extend one (1) year warranty of cathodic protection system one (1) year beyond date of energizing.

3.7 ELECTRICAL SUPPLY

- A. There is a 120 volt power available at the tank.
- B. Coordinate with owner and connect electrical source to cathodic protection controls.
- C. Bury all exterior wiring underground from electrical source to cathodic protection controls.

- - End - -

SECTION 33 10 00

WATER UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies materials and procedures for construction of underground water distribution for domestic and/or fire supply systems outside the building that are complete and ready for operation. This includes piping, structures, appurtenances and all other incidentals.

1.2 RELATED WORK

- A. General plumbing: Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
B. Submittals: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

1.3 DEFINITIONS

- A. Water distribution system: Pipelines and appurtenances which are part of the distribution system outside the building for potable water and fire supply.
B. Water service line: Pipeline from main line to 5 feet outside of building.

1.4 ABBREVIATIONS

- A. PVC: Polyvinyl chloride plastic.
B. DIP: Ductile iron pipe.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Ensure that valves are dry and internally protected against rust and corrosion. Protect valves against damage to threaded ends and flange faces.
B. Use a sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
C. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
D. Protect stored piping from moisture and dirt by elevating above grade. Protect flanges, fittings, and specialties from moisture and dirt.

- E. Store plastic piping protected from direct sunlight and support to prevent sagging and bending.
- F. Cleanliness of Piping and Equipment Systems:
 - 1. Care shall be exercised in the storage and handling of equipment and piping material to be incorporated in the work. Debris arising from cutting, threading and welding of piping shall be removed.
 - 2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.

1.6 COORDINATION

- A. Coordinate connection to incoming water main with City of Columbia, SC Public Utility Company and with the Salem VA Medical Center campus loop water line with the COR.

1.7 QUALITY ASSURANCE:

- A. Products Criteria:
 - 1. When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
 - 2. A nameplate bearing manufacturer's name or trademark, including model number, shall be securely affixed in a conspicuous place on equipment. In addition, the model number shall be either cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
- B. Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least three years.
- C. Regulatory requirements:
 - 1. Comply with the rules and regulations of the public utility company having jurisdiction over the connection to public water lines and the extension and/or modifications to public utility systems.
 - 2. Comply with the rules and regulations of the Federal, State, and/or Local Health Department having jurisdiction for potable water-service.
- D. Provide certification of factory hydrostatic testing of not less than 500 psi (3.5 MPa) in accordance with AWWA C151. Piping materials shall bear the label, stamp or other markings of the specified testing agency.

E. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COR prior to installation.

F. Applicable codes:

1. Plumbing Systems: IPC, International Plumbing Code.
2. Electrical components, devices and accessories shall be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

1.8 APPLICABLE PUBLICATIONS

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

B. American National Standards Institute (ANSI):

MSS SP-60-2004Connecting Flange Joint Between Tapping Sleeves
and Tapping Valves

MSS SP-123-1998(R2006) ..Non-Ferrous Threaded and Solder-Joint Unions
for Use With Copper Water Tube

C. American Society of Mechanical Engineers (ASME):

A112.6.3-2001.....Floor Drains

B16.18-2001.....Cast Copper Alloy Solder Joint Pressure
Fittings

B16.22-2001.....Wrought Copper and Copper Alloy Solder Joint
Pressure Fittings

B16.24-2006.....Cast Copper Alloy Pipe Flanges and Flanged
Fittings; Classes 150, 300, 600, 900, 1500 and
2500

B31.....Code for Pressure Piping Standards

D. American Society for Testing and Materials (ASTM):

A36/A36M-08.....Carbon Structural Steel

A48/A48M-08(2008)Gray Iron Castings

A536-84(2009).....Ductile Iron Castings

A674-10.....Polyethylene Encasement for Ductile Iron Pipe
 for Water or Other Liquids

B61-08.....Steam or Valve Bronze Castings

B62-09.....Composition Bronze or Ounce Metal Castings

B88/B88M-09.....Seamless Copper Water Tube

C651-05.....Disinfecting Water Mains

C858-10e1.....Underground Precast Utility Structures

D1785-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe,
 Schedules 40, 80, and 120

D2239-03.....Polyethylene (PE) Plastic Pipe (SIDR-PR) Based
 on Controlled Inside Diameter

D2464-06.....Threaded Poly (Vinyl Chloride) PVC Pipe
 Fittings, Schedule 80

D2466-06.....Poly (Vinyl Chloride) (PVC) Pipe Fittings,
 Schedule 40

D2467-06.....Poly (Vinyl Chloride) (PVC) Plastic Pipe
 Fittings, Schedule 80

D2609-02(2008).....Plastic Insert Fittings for Polyethylene (PE)
 Plastic Pipe

D3350-10a.....Polyethylene Plastics Pipe and Fittings
 Materials

F714-10.....Polyethylene (PE) Plastic Pipe (SDR-PR) Based
 on Outside Diameter

F1267-07.....Metal, Expanded, Steel

E. American Water Works Association (AWWA):

C651-05.....Disinfecting Water Mains

M23-2nd Ed.....PVC Pipe, Design and Installation

M44-2nd Ed.....Distribution Valves: Selection, Installation,
 Field Testing and Maintenance

F. NSF International (NSF):

NSF/ANSI 14 (2013).....Plastics Piping System Components and Related
Materials

NSF/ANSI 61-2012.....Drinking Water System Components - Health
Effects

NSF/ANSI 372-2011.....Drinking Water System Components - Lead Content

G. American Society of Safety Engineers (ASSE):

1003-2009Water Pressure Reducing Valves

1060-2006.....Performance Requirements for Outdoor Enclosures
for Fluid Conveying Components

1.9 WARRANTY

A. The Contractor shall remedy any defect due to faulty material or workmanship and pay for any damage to other work resulting therefrom within a period of one year from final acceptance. Further, the Contractor will furnish all manufacturers' and supplier's written guarantees and warranties covering materials and equipment furnished under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Material or equipment containing a weighted average of greater than 0.25 percent lead shall not be used in any potable water system intended for human consumption, and shall be certified in accordance with NSF/ANSI 61 or NSF 372.
- B. Plastic pipe, fittings, and solvent cement shall meet NSF/ANSI 14 and shall be NSF listed for the service intended.

2.2 FACTORY-ASSEMBLED PRODUCTS

A. Standardization of components shall be maximized to reduce spare part requirements. The contractor shall guarantee performance of assemblies of components, and shall repair or replace elements of the assemblies as required to deliver specified performance of the complete assembly.

2.3 SAFETY GUARDS

- A. All equipment shall have moving parts protected to prevent personal injury. Pump shafts and couplings shall be fully guarded by a sheet steel guard, covering coupling and shaft but not bearings. Material shall be minimum 16-gauge sheet steel; ends shall be braked and drilled and attached to pump base with minimum of four 1/4 inch (6 mm) bolts. Reinforce guard as necessary to prevent side play forcing guard onto couplings.

2.4 LIFTING ATTACHMENTS

- A. Equipment shall be provided with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered, without bending or distortion of shape, such as rapid lowering and braking of load.

2.5 COPPER TUBE AND FITTINGS

- A. Soft Copper Tubing: ASTM B88, Type K water tube, annealed temper.
B. Hard Copper Tubing: ASTM B88, Type K / water tube, drawn temper.
C. Fittings: ASME B16.18, cast copper alloy, solder joint pressure fittings.
D. Brazing Alloy: AWS A5.8/A5.8M, Classification BCuP.
E. Bronze Flanges: ASME B16.24, Class 150, with solder joint ends. ASME B16.24, Class 300 flanges if required to match piping.
F. Copper Unions: ANSI MSS SP-123, cast copper alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.

2.6 VALVES

- A. Valve Accessories and Specialties
1. Valve Boxes: AWWA M44 with top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel.
 2. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut. (Provide two wrenches for Project.)

B. Corporation Valves and Curb Valves

1. Service-Saddle Assemblies: AWWA C800.
 - a. Service Saddle: Copper alloy with seal and threaded outlet for corporation valve.
 - b. Corporation Valve: Bronze body and ground-key plug, with threaded inlet and outlet matching service piping material.
2. Curb Valves: AWWA C800, bronze body, ground-key plug or ball, wide tee head, with inlet and outlet matching service piping material, minimum pressure of 200 psi (1375 kPa).
3. Service Boxes for Curb Valves: AWWA M44, cast iron telescoping top section; plug shall include lettering "WATER"; bottom section with base that fits over curb valve.
4. Shutoff Rods: Steel, tee-handle with one pointed end. Stem length shall extend 2 feet (600 mm) above top of valve box for operation of deepest buried valve, with slotted end matching curb valve.

C. Post-Indicator: NFPA 24 and be fully compatible with the valve and supervisory switches.

2.7 PROTECTIVE STAINLESS STEEL ENCLOSURE

A. SS Protection Enclosures: Designed to protect aboveground water piping, equipment, or specialties from freezing and damage.

1. 7 Gauge Stainless Steel housing with dimensions as indicated on the drawings, but not less than those required for access and service of protected unit.

2.8 WARNING TAPE

A. Warning tape shall be standard, 4 mil. Polyethylene, 3 inch (76 mm) wide tape, detectable type, blue with black letters and imprinted with "CAUTION BURIED WATER LINE BELOW".

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Use pipe, fittings, and joining methods for piping systems according to the following applications.

1. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

2. Do not use flanges or unions for underground piping.
 3. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- B. Underground water-service piping NPS 3/4 to NPS 3 (DN 20 to DN 80) shall be the following:
1. Soft copper tube with wrought-copper, solder-joint fittings; and brazed joints.
- C. Aboveground and Vault Water-Service Piping NPS 3/4 to NPS 3 (DN 20 to DN 80) shall be any of the following:
1. Hard copper tube with wrought-copper, solder-joint fittings; and joints.
 2. PVC, Schedule 80 pipe; socket fittings; and solvent-cemented or threaded fittings; and threaded joints.

3.2 COPPER PIPE

- A. Copper piping shall be installed in accordance with the Copper Development Association's Copper Tube Handbook and manufacturer's recommendations.
- B. Copper piping shall be bedded in 6 inches (150 mm) of sand.

3.3 VALVE INSTALLATION

- A. AWWA Valves: Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Valves: Install each underground valve and valves in vaults with stem pointing up and with vertical cast iron indicator post.
- C. MSS Valves: Install as component of connected piping system.
- D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- E. Raise or lower existing valve and curb stop boxes and fire hydrants to finish grade in areas being graded.

3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties. Install water service lines to a point of connection within approximately 5 feet (1500 mm) outside of building(s) to which service is to be connected and make connections thereto. If building services

have not been installed provide temporary caps and mark for future connection.

3.5 FIELD QUALITY CONTROL

- A. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Prior to final acceptance, provide a video record of all piping from the building to the municipal connection to show the lines are free from obstructions, properly sloped and joined.
- C. Perform hydrostatic tests at not less than one-and-one-half times working pressure for two hours.
 - 1. Increase pressure in 50-psi (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psi (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- D. Prepare reports of testing activities.

3.6 IDENTIFICATION

- A. Install continuous underground warning tape 12 inches (300 mm) directly over piping.

3.7 CLEANING

- A. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
- B. Use purging and disinfecting procedure prescribed by local utility provider or other authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - 1. Fill the water system with a water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
 - 2. Drain the system of the previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow system to stand for 3 hours.
 - 3. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.

4. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- C. Prepare reports of purging and disinfecting activities.

--- E N D ---

SECTION 33 10 00.01
POTABLE WATER ANALYTICS (PWA) SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

Potable Water Analytics (PWA) system requirements.

1.2 DESCRIPTION

The Contractor shall furnish and install a Potable Water Analytics (PWA) system for continuous water monitoring of the water supply coming into the water tank from the Columbia city water system as well as the water draining from the tank into the WJB Dorn VA Medical Center's domestic water supply system to meet the requirements of VHA Directive 1061.

- A. BASIS OF DESIGN: Phigenics Potable Water Analytics System, Phigenics, LLC, 3S701 West Avenue, Suite 100, Warrenville, IL 60555, phone: 844-850-4087, www.phigenics.com
- B. SCOPE: Furnish and install a complete panel mounted system for automatic monitoring of free or total chlorine residuals, pH, temperature, pressure, and dissolved solids. The system must continuously monitor these sensors and make the data available securely using any Internet connected device. In addition the system must store WMP documents, verification activities, corrective actions, and validation test results in addition to data recorded from other existing PWA systems on the WJB Dorn VA Medical Center campus.
- C. CONFLICTS: Requirements contained in these specifications apply to and govern the work under this section. All federal government and VA requirements contained in other sections of this specification apply. This specification is not intended to conflict or override any items unless specifically indicated. If a conflict is noted with any aspect of these specifications the COR is to be notified prior to proceeding with any aspect of the project.

1.3 RELATED REQUIREMENTS

- A. 01 00 00 GENERAL REQUIREMENTS
- B. 01 35 26 SAFETY REQUIREMENTS
- C. 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1.4 DEFINITIONS

Contractor: The construction entity that holds the contract for construction for this project, or the subcontractor performing the water tower improvements. Division of the work required of this section is the responsibility of the entity that holds the contract for construction.

Owner: The WJB Dorn VA Medical Center

1.5 SHOP DRAWINGS

- A. Comply with Section 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Submit product data for all items specified.
- B. Submit three (3) sets of Operation/Maintenance Manuals directly to the WJB Dorn VA Medical Center.

1.6 GUARANTEE

- A. Guarantee the Potable Water Analytics system against all defects in materials, workmanship, installation, and ability to coordinate/communicate with existing PWA stems on the WJB Dorn VA Medical Center campus for a period of one (1) year.

1.7 DESIGN and PERFORMANCE REQUIREMENTS

DESIGN CRITERIA:

- 1. Chlorine Monitor - The chlorine monitor must meet the following minimum requirements:
 - a. Measure free residual oxidant (FRO) or total residual oxidant (TRO) in potable water systems using the EPA accepted DPD colorimetric test method for measuring chlorine.
 - b. Measure chlorine residuals at configurable frequencies as short as 110 seconds.
 - c. Support water sample temperatures directly of up to 131°F, and up to 150°F using a sample cooler (sample cooler available for additional cost).
 - d. Comply with US EPA regulation 40 CFR 140.74, Standard Method 4500-CLG, and US EPA Method 334.0 "Determination of Residual Chlorine in Drinking Water Using an Online Chlorine Analyzer."
 - e. Support a Modbus interface.
 - f. 4-20mA output that is proportional to the Chlorine measurement.
 - g. 2 Alarm Relays that are configurable to activate based on the Chlorine measurement.

2. Water Temperature - The water temperature sensors must meet the following minimum requirements:
 - a. Compact temperature sensor with built-in transmitter
 - b. Signal output: 4 to 20 mA
 - c. Probe length: 30, 50, 100 or 150-mm
 - d. Connection: ¼" or ½" NPT male
 - e. Body must be stainless steel AISI 316L
 - f. Temperature range: -58 to 302°F
 - g. Pressure rating: 300 PSI
 - h. M12 connector with pre-cut cord lengths for hard wiring to PWA system
 - i. Sensor accuracy class A
3. pH Sensors - The pH sensors must meet the following minimum criteria:
 - a. Range: 0-14 pH
 - b. Response: 95% in less than 5 seconds
 - c. Operating Pressure: 100 PSI
 - d. Temperature Range: 50 - 212°F
4. Pressure Sensors - The pressure sensors must meet the following minimum criteria:
 - a. Programmable pressure sensor with analog and switching output
 - b. ¼" NPT male or female connection size
 - c. Measurement Range: -14.6 - 145 PSI
 - d. Temperature Range: -13 - 176°F
 - e. M12 connector with pre-cut cord lengths for hard wiring to PWA system
 - f. LED Display
 - g. Body must be stainless steel AISI 316L with IP 65 & 67 protection
 - h. Accuracy range: ± 0.4%
5. Dissolved Solids Sensors - The dissolved solids sensors must meet the following minimum criteria:
 - a. Conductivity Range: 0 - 30,000 uS
 - b. Pressure Rating: 0 - 150 PSI
 - c. Cell Constant: 1.0
 - d. Thermistor: 10k ohm
 - e. Temperature Range: 32 - 140°F

6. Data Logging Device - The data logging device must meet the following minimum criteria:
 - a. Automatically collect and log data at user selected intervals.
 - b. Log device data date/time stamps and store in non-volatile memory.
 - c. Store interval data locally until the next scheduled upload.
 - d. Support a Modbus interface plus eight additional analog or pulse input signals.
 - e. Capable of transporting data securely to servers owned and operated by the equipment supplier over a cellular, Ethernet Wide Area Network (WAN), or WiFi connection, as required.
 - f. Capable of providing secure data access and analysis using any Internet connected device.
 - g. NEMA 4X rating

PART 2 - PRODUCTS

2.1 PWA Advanced Monitoring System

Panel mounted system for automatic monitoring of free or total chlorine residuals, pH, temperature, pressure, and dissolved solids. The system must continuously monitor these sensors and make the data available securely using any Internet connected device.

2.2 Software Platform

- A. Infrastructure Reliability and Information Security - The software platform must meet the following Infrastructure Reliability and Information Security Management requirements:
 1. The web application host will provide a service level agreement ("SLA") with a service commitment to a monthly uptime percentage of at least 99.95%. Provide Host Documentation.
 2. The web application will be hosted at a datacenter compliant with FedRAMP requirements at the moderate impact level and in accordance with the Federal Cloud Computing Strategy. Provide Host Documentation.
 3. The database will be securely backed up hourly for disaster recovery purposes and provide a minimum durability of 99.999999999% and uptime of 99.999%. Provide Host Documentation.

4. The web applications will be hosted as a Software-as-a-Service (SaaS) data delivery model. This will enable easy access to all data in a highly secure environment via the Internet using any internet connected device including personal computers and mobile devices.
 5. The web application will employ at a minimum TLS 1.2 with 128-bit AES encryption and authentication.
 6. The web application will be delivered by way of a secure login-protected environment with registered HTTPS security provisions.
- B. Application Level Security - The software platform must meet the following minimum Application-Level Security requirements:
1. A user account and password of adequate complexity will be required for each individual user who accesses the system. New user accounts may only be created by administrators with the appropriate level of authorization.
 2. Administrators shall have the ability to easily remove access from users no longer authorized to use the application.
 3. All edits, deletions, or changes to existing data will be logged with the date and time, user committing the change, and all original data will be preserved. This audit trail will be available to users with the appropriate level of access.
 4. The web application shall have varying levels of access for data collectors, operators, site managers, water management team members, and administrators.
 5. Users can be restricted by region or facility. A user restricted to a specific facility shall only be able to view data and information pertaining to that facility.
- C. Data Collection - The software platform must meet the following minimum Data Collection requirements:
1. Administrators will be able to add, edit, or remove sample points in the system as needed.
 2. A web page will be available in the application for data collectors to enter test results.
 3. The required testing frequency of each sample point can be configured as daily, weekly, or monthly. Alerts can be issued if required sample is missing.

4. The system will allow data to easily be exported to a suitable format for offline use.
 5. Time-series charts will be provided in real-time for all data recorded in the system. Charts will show alert limits and can be easily customized based on predefined specifications.
 6. A daily summary report will be generated in real-time by the web application, indicating total number of samples tested by region and facility, total number of samples out of specification for chlorine and temperature, as well as chlorine range and average temperature for each facility.
 7. The web application will allow for the storage of electronic documents online. The storage capability will include automated document versioning and all versions of all documents will be retained.
 8. The web application data will be time-stamped with the time it was entered as well as the time the user records it. Edits or changes to the data are logged so the original values can always be recovered.
 9. The web application will have the ability to track customer service requests. Requests can be entered by plant personnel or by authorized contractors/vendors and tracked through the system until they are completed which makes it easy to marry equipment operations with equipment repair and maintenance.
 10. Viewer rights will be determined based on the direction set forth by the client so those who have access can only see or do what they are authorized to see or do, and no one will have a view into areas that are outside the scope of their roles and responsibilities.
 11. The client may reclassify any properties, as and when required, from high risk to low risk or vice versa.
- D. Mobile Requirements - The software platform must meet the following minimum Mobile requirements:
1. A mobile application will be available for data entry on modern smartphones, including Apple IOS, Google Android, and Windows Phone operating systems.
 2. Data can be entered, viewed, and edited on the mobile application by users with the appropriate level of access.

3. To enable resilient operation in the field, the mobile application will operate with or without an active internet connection. In the absence of an internet connection, data will be stored on the local device and synchronized with the remote server upon restoration of internet access.
 4. The mobile application will be capable of reading QR codes (barcoding) affixed to sample points to identify the sample and minimize data input errors. The web application will be capable of printing QR codes for the associated sample points.
- E. Alerts Requirements - The software platform must meet the following minimum Alerts requirements:
1. Alert levels can be set for each individual parameter at every sample point in the system. Alert levels can be easily adjusted at any time by users with the appropriate authorization.
 2. Alerts shall be issued electronically, by email, upon entry of any data exceeding predefined alert limits.
 3. Each user account can be configured to receive alert emails by region or facility.
 4. Alerts will be clearly indicated when viewing data in the web application.
 5. The web application will incorporate a work order system that will allow alerts to be prioritized and corrective actions to be logged. Users will be able to view the alert and work order history by region or facility for which they are authorized, down to the individual sample points.
- F. Remote Data Acquisition - The software platform must meet the following minimum Remote Data Acquisition requirements:
1. A system will be provided to allow rapid deployment of remote sensors throughout the facility. The sensors will upload data at regular intervals to the remote servers and the data will be easily accessible in the web application.
 2. The system will be capable of acquiring data from sensors with the following outputs types; current, voltage, resistance, and pulse.
 3. The data acquisition system will be capable of both Ethernet and 3G cellular connectivity.

4. The data acquisition system will issue alerts electronically, by email, when a sensor reading exceeds predefined alert limits.
- G. Laboratory Integration - The software platform must meet the following minimum Laboratory Integration requirements
1. All *Legionella* and water chemistry test results will be available online immediately upon completion of the test.
 2. An executive summary dashboard will be provided in the web application to graphically display *Legionella* test results and trends.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The total system must be pre-wired and pre-plumbed on a panel to ensure high quality and a simple installation.
Installation must require only one tap from the main water line to provide a continuous sample stream of water to the monitoring system. The system must be fully powered by a single 110V power supply.
1. One water tap to provide a sample point from the water supply line.
 2. One water drain for the sample line
 3. One 110V electrical outlet
- B. The Contractor shall meet the following requirements for equipment installation:
1. General Requirements
 - a. Surge protection
 - b. 12-ft power cord with a standard 3-prong plug
 - c. Single 110V outlet
 - d. Power consumption is less than 2A
 - e. Minimum spacing of 1 ft on either side and above the PWA for connections
 2. Water System Requirements
 - a. Requires at least 5 PSI to operate
 - b. Water temperatures greater than 130°F at 30 PSI MUST have a sample cooler
 - c. Water pressures greater than 90 PSI at 70°F MUST have a pressure regulator

- d. Minimum flow rate to the PWA is 0.25 GPM
- 3. Sample Line Installation
 - a. Sample line should be ¼" flexible copper
- 4. Drain Line Installation
 - a. There are 2 drain lines, both with ½" NPT female connection
 - b. Drain line should be ½" copper or CPVC
 - c. Drain line must be sloped down to drain with an air gap
- C. Technical Support/Startup of Equipment - The contractor will provide technical support from the PWA manufacturer during installation and conduct system startup.
 - 1. Provide input for location of PWA
 - 2. Provide input for location of chlorine injection (if applicable) and water sample tap
 - 3. Provide technical guidance to installer during installation
 - 4. Conduct system startup
 - 5. Verify that all applicable parameters are recording correctly and being transferred to the web-based data management system
- D. Monthly Service for PWA Systems - The PWA systems must be properly calibrated and maintained to ensure accurate and reliable performance on an ongoing basis. The monthly service for each system shall include:
 - a. Training
 - b. Monthly refreshment of test reagents for the chlorine analyzer
 - c. All consumable parts for system components
 - 1) Chlorine Analyzer - reagents, tubing/cuvette kits, replacement cuvettes, check valve sets and check valve flushing kits
 - d. Cellular data connection service

- - End - -

**WM. J. B. DORN VAMC
LEAD WORK PERMIT REQUEST**

Supervisor: Type or print neatly. Complete all information in Section 1 at least 5 days in advance and send the completed form to the Chief, Safety & Emergency Management Service (150). Incomplete permit requests will NOT be processed. Work may not begin until the Safety Manager or his/her designee has approved the permit.

SECTION I

Building: _____ Room/Area: _____

Beginning Date: _____ Ending Date: _____

Explain type of work or activity: _____

QUESTION

	Y	N	N/A
Is abatement scheduled as part of this work			
If yes, Contractor / Engineering Staff will perform			
Contractor Name:			
Foreman or POC: Phone:			
Station Project Number:			
Engineering POC: Phone:			
Has monitoring been conducted for this type of activity?			
If yes, when? Who performed?			
Lead exposure assessment has been completed for this area/task?			

Specify engineering/administrative controls and personal protective equipment to be used:

Supervisor Signature/Date: _____

SECTION II:

Work area review: Work procedure review: Waste disposal:

Air sampling required? Type and Frequency:

Work authorized: Permit expires: Work not authorized:

Permit request incomplete:

Chief, Safety & Emergency Management Service:



Water Tower overall - 300 gal steel tank



Closer view of water reservoir



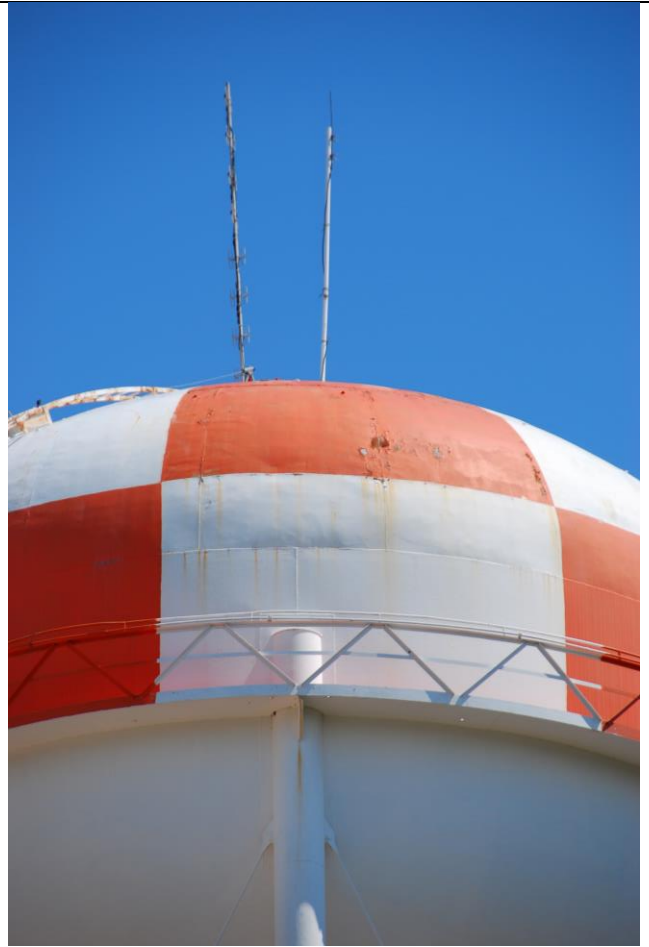
Reservoir supports/bracing



Support bracing detail



Reservoir supports/bracing



Reservoir existing paint scheme