U.S. FOREST SERVICE
PACIFIC SOUTHWEST REGION, REGION 5
ANGELES NATIONAL FOREST

CHIALO CAMPGROUND COMPLEX – WATER SYSTEM REHABILITATION

CONTRACT SPECIFICATIONS

FEBRUARY 2025

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SECTION 01026 METHOD OF MEASUREMENT

PART 1 - GENERAL

1.1 SCOPE

This section defines the terms associated with the method of measurement for determining final payment under the terms of the contract.

1.2 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work specified in this section.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 METHODS OF MEASUREMENT

One of the following methods of measurement for determining final payment is designated on the Schedule of Items for each pay item:

A. Contract Quantities (CQ)

These quantities denote the final number of units to be paid for under the terms of the contract. They are based upon the original design data available prior to advertising the project. Original design data include the preliminary survey information, design assumptions, calculations, drawings and the presentation in the contract.

B. Staked Quantities (SQ)

These quantities are determined from staked measurements prior to construction.

C. Actual Quantities (AQ)

These quantities are determined from the measurements of the completed work.

D. Vehicle Quantities (VQ)

These quantities are measured in the hauling vehicles.

E. Lump Sum Quantities (LSQ)

These quantities denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job. They will not be measured.

END OF SECTION

SECTION 01061 APPLICABLE CODES

PART 1 - GENERAL

1.1 SCOPE

This section describes the codes and standards which apply to the work in this contract.

1.2 CODES AND STANDARDS

The following codes and standards shall apply to the work in this contract.

A. Title 24 California Building Standards Code, Latest Edition
B. California Plumbing Code, Latest Edition.
C. California Mechanical Code, Latest Edition.
D. California Electrical Code, Latest Edition
E. California Energy Code, Latest Edition
F. American Water Works Association (AWWA), Latest Edition.
G. American Society for Testing Materials (ASTM), Latest Edition.
H. American National Standards Institute, (ANSI).
I. American Concrete Association {ACI).
J. Portland Cement Association {PCA).
K. Local County Environmental Health Services Requirements
L. Manufacturer's Instructions.
M. As required by the applicable listing or testing agency.
N. National Sanitation Foundation, Standard 61
O. OSHA Occupational Safety and Health Agency
P. UL Underwriters Laboratories
Q. Clean Water Act
R. Safe Drinking Water Act

1.3 DEFINITIONS

Building Official as used in the Uniform Building Code and Uniform Building Code Standard will be the Contracting Officer.

Administrative Authority as used in the California Code of Regulations will be the Contracting Officer.

1.4 MEASUREMENTS AND PAYMENT

No separate measurement or payment will be made for the work specified in this section. Payment will be included in the contract price for other items of work.

PART 2 - PRODUCTS

2.1 All products and materials in the work shall meet the standards and requirements of the codes and standards referenced in Part 1 General of this Section, unless otherwise SHOWN ON THE ORAWINGS or called for in the specifications. When more stringent requirements are called out in these specifications or SHOWN ON THE DRAWINGS, the more stringent requirements shall take precedence over the codes and standards.

2.2 Plastic pipe and components shall be marked with NSF certification for potable water use.

PART 3 - EXECUTION

3.1 All work in the contract shall meet the standards and requirements of the codes and standards referenced in Part 1 General of this section, unless otherwise SHOWN ON THE DRAWINGS or called for in the specifications. When more stringent requirements are called out in these specifications, or SHOWN ON THE DRAWINGS, the more stringent requirements shall take precedence over the codes and standards.

END OF SECTION

SECTION 01200 MOBILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

This work shall consist of preparatory work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and for all other work and operations that must be performed or that cause costs to be incurred prior to beginning work on the various items on the project site.

1.2 MEASUREMENT AND PAYMENT

Progress payments will be made as follows:

A. When 5 percent or more of the original contract amount is earned from other pay items, 50 percent of the amount for mobilization, or 5 percent of the original contract amount, whichever is less, will be paid.

B. When 10 percent or more of the original contract amount is earned from other pay items, 100 percent of the amount for mobilization, or 10 percent of the original contract amount, whichever is less, will be paid.

C. Upon completion of all work on the project, any unpaid amount for mobilization will be paid.

The total of all payments shall not exceed the original contract amount for this item.

The quantities, as measured above, will be paid for at the contract unit price for Item 01200, Mobilization.

END OF SECTION

SECTION 01300 SUBMITTALS

PART 1 - GENERAL

1.1 SCOPE

This work consists of submitting samples, shop drawings, technical information, substitutions, mix designs, and as-built drawings. The specification describes the review and approval process for submittals.

1.2 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work specified in this section.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.1 SHOP DRAWINGS

A. Original Submittal

The Contractor shall submit three copies of all shop drawings for review.

B. Review and Resubmittal

The Government will review and return the shop drawings within 15 calendar days. The Contractor shall make corrections noted and resubmit four copies of the corrected shop drawings. The Government will review and return resubmittals within 7 calendar days.

C. Final Submittal

When all corrections have been made and approved, the Contractor shall submit three copies of the final shop drawings.

D. Certifications

All shop drawings shall be certified by a Professional Engineer or Architect, licensed in the State of California, practicing within the scope of his license.

3.2 SAMPLES

A. Original Submittal

The Contractor shall submit one sample of each item for which samples are required. The samples shall be representative of the actual material proposed for use in the project and of sufficient size to demonstrate design, color, texture and finish as they will appear in the completed installation. The product shall be clearly marked to identify the specific product and location for use in this project.

B. Review and Resubmittal

The Government will review samples within 15 calendar days. The Contractor shall resubmit new samples of unsatisfactory items in accordance with paragraph 3.2 A. The Government will review resubmittals within 7 calendar days.

C. Approval

The Contractor shall not deliver any item to the project site until approval of the submittal for that item has been obtained. All samples will be returned to the Contractor at or before the final acceptance of the project.

3.3 CATALOG DATA

A. Original Submittal

The Contractor shall submit two copies of catalog data. If the shop drawings have items that require submittal of catalog data, the catalog data shall be submitted with the shop drawings.

B. Identification

Clearly identify items submitted in each catalog or on each page. If the entire catalog is submitted, the items shall also be identified on the cover of the catalog by page and item number. Product data shall be clearly annotated to identify the specific product and model and data applicable to its installation.

C. Review and Resubmittal

Review and resubmittal of catalog data shall be in accordance with paragraphs 3.1 B. and C.

D. A loose leaf binder containing literature for each component installed shall be submitted to the Contracting Officer prior to final acceptance of work. Information in the binder shall include: manufacturer's name, product type, model, size, characteristics of the product or equipment, address and phone number of manufacturer and supplier. The name(s) of the installer or subcontractor shall also be listed for each item. The binder shall include a table of contents, listing each item included in the binder.

3.4 MIX DESIGN

A. Original Submittal

The Contractor shall submit two copies of the mix design for all materials for which mix designs are required.

B. Review and Resubmittal

The Government will review mix designs within 7 days. The Contractor shall resubmit unsatisfactory mix designs in accordance with paragraph 3.4 A. The Government will review resubmittal within 3 days.

C. Approval

The Contractor shall not deliver any material requiring a submittal to the project site until approval of the submittal for that material has been obtained.

3.5 AS-BUILT DRAWINGS

A. On completion of the work, the Contractor shall submit:

   a. Two complete sets of electronic full size as-built drawings of the project. The electronic drawings shall be in ACAD format on CD.

   b. A complete set of drawings of all contract drawings and shop drawings. The drawings may be non-reproducible prints.

Any changes in location, material, substitutions, and other approved deviations shall be marked clearly in red.

3.6 CONTRACTOR'S RESPONSIBILITY

A. Representation

The Contractor shall certify that all shop drawings submitted for approval are in compliance with the contract drawings, specifications and other approved submittals.

B. Deviations

Approval of shop drawings, samples, or catalog data shall not relieve the Contractor from responsibility for errors or omissions therein.

C. Prohibitions

No portion of the work requiring a shop drawing, sample, or catalog data shall commence nor fabrication begin prior to approval of such items.

3.7 SUBSTITUTION

Materials in the specifications may be followed by the words "or approved equal." In these cases, wherever the name or brand of a manufacturer's article is specified, it is used as a measure of quality and utility or a standard. If the Contractor prefers to use any other brand or manufacturer of same quality, appearance, and utility to that specified, he shall request substitution as provided

below, not less than 30 days before the planned installation of the item. The Contracting Officer will approve or disapprove the request for substitution and his decision shall be final. Unless substitutions are requested within the time stated above and as provided below, no deviation from the specifications will be allowed.

Requests for substitutions will only be considered if contractor submits the following:

A. Complete technical data including drawings, complete performance specifications, test data, samples and performance tests of the article proposed for substitution. Submit additional information if required by Contracting Officer. All items in the above information shall be circled, tagged, or marked in some way to indicate all deviations or differences which the proposed item differs from the originally specified item.

B. Similar data as above for item originally specified. All items shall be marked to identify where/how the proposed substitution will differ.

C. A statement by the Contractor that the proposed substitution is in full compliance with the contract documents, applicable codes, and laws.

D. A list of other trades which may be affected by the substitution.

E. The Contractor shall be responsible for any effect upon related work in the project for any substitution and shall pay any additional costs generated by any substitutions.

END OF SECTION

SECTION 01360 ENVIRONMENTAL MITIGATION

PART 1 - GENERAL

1.1 SCOPE

This work consists of requirements that must be followed to avoid impacts to biological, botanical, and heritage resources.

1.2 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work specified in this section.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 Mandatory Awareness Training

All construction personnel shall be required to attend awareness training at tailgate sessions upon first arriving on the project. Awareness will include explanation and importance of adhering to the General and Specific Design Criteria, as well as identification of certain species to insure they are not harmed in the construction of the project.

3.2 General Design Criteria

A. Existing logs and rocks shall not be moved without first obtaining approval from the C.O.R.

B. No work shall be allowed after sunset or before sunrise.

C. Worksites shall be cleaned daily. Food products must be removed from the site on a daily basis.

D. Vehicles shall only be allowed on roads and parking areas, with the exception of construction equipment which will only be allowed on designated, construction areas.

E. Materials shall only be stored on roads, parking areas, or existing disturbed areas void of vegetation.

F. Construction equipment shall be cleaned of all dirt, vegetation, or other deleterious material prior to entering the National Forest. At designated sites, construction equipment shall be cleaned of all dirt, vegetation, or other deleterious material prior to being moved from the site.

END OF SECTION

SECTION 01400 QUALITY CONTROL & QUANTITY MEASUREMENT

PART 1 - GENERAL

1.1 WORK

This work shall consist of providing quality control in conformance with the Inspection of Construction provisions of this contract to ensure compliance with the drawings, specifications, and provisions of the contract, and measuring the quantities of completed work in conformance with the provisions of the applicable specification. The Contractor shall provide all personnel, equipment, tests, and reports necessary to meet the requirements of this specification.

1.2 MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work specified in this Section.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 QUALITY CONTROL & QUANTITY MEASUREMENT SYSTEM

A. The Contractor shall provide and maintain a quality control system that will ensure that all services, supplies, and construction required under this contract conform to the contract requirements. The Contractor shall perform, or cause to be performed, the sampling, inspection, and testing required for substantiating that all supplies, services, and construction conform to the contract requirements.

B. The Contractor shall also perform, or cause to be performed, all measurement of quantities of materials incorporated into the work or work processes that are to be measured under the provisions of the contract.

a. Quality Control Plan:

i. The Contractor shall submit in writing the following:

1. Authorities and responsibilities of inspection and testing personnel.

2. Experience and qualifications of inspection and testing personnel to be assigned and name and location of any (for hire) testing facility to be used.

ii. Approval of Quality Control Plan:

1. The contractor's proposed quality control plan for all items requiring quality control shall be submitted to the Contracting Officer for review prior to the Contractor commencing work.

2. Within 7 days of receipt of plan, the Contracting Officer shall notify the Contractor whether the plan adequately covers quality control requirements.

3. Construction work shall not be performed prior to contractor's receipt of written approval of the proposed plan.

4. The Contractor shall submit to the Contracting Officer, in writing, any proposed changes in the approved quality control plan.

5. Proposed changes shall not be put into effect until approved in writing by the Contracting Officer.

3.2 SAMPLING, TESTING, INSPECTION, & MEASUREMENT OF QUANTITIES

A. The Contractor shall provide and maintain appropriate measuring and testing devices, equipment, and supplies to accomplish the required measurement, testing, and inspection in a timely manner. Tests, measurements, and certifications shall be

made as required by the drawings and specifications. The Contractor shall take samples and perform inspections and tests necessary to achieve the quality of construction required by the contract and make required measurements of work under this contract performed onsite or offsite. Sampling and testing frequency for specific items shall be as listed below in Section 3.2.C and in the individual specifications.

B. Frequencies for making approvals, inspecting, sampling, testing, and measuring the work shown in the schedule of items shall be as shown in table. Responsibilities shall be as shown below. The following key refers to abbreviations shown below.

   a. CC: Certification and/or inspection, measuring, sampling and testing by Contractor or Contractor's Representative.

   b. CL: Certification and/or inspection, measuring, sampling and testing by a certified testing laboratory.

   c. PE: Approvals, inspections, sampling, testing, measuring, or surveying underthe direction of and certification by a Professional Engineer registered in the Stateof California.

   d. MR: Manufacture's Representative experienced and specialized in the application of their product.

C. The frequencies shown in the table 1 shall be considered as minimum for the purposes of quality control and quantity measurement. Passing test results shall not be construed as acceptance of any Section. The results of quality testing shall not be used for/in lieu of acceptance sampling and testing.

TABLE J - REQUIRED

QUALITY CONTROL, INSPECTION, SAMPLING, TESTING, AND MEASUREMENT

SECTION	APPROVALS, INSPECTIONS, SAMPLING, MEASUREMENTS, OR TESTS REQUIRED	MINIMUM FREQUENCY	CERTIFICATION
02220	EARTHWORK COMPACTION	1 Procter Test per soil type	CL

	(ALL)		
02318	Compaction of earthwork for Roadways	1 random field density test per lane per 150 LF	C L
02318	Compaction of earthwork for Helipad and Parking Lots	1 random field density test per 500 SF	C L
0221	Compaction of earthwork for concrete flatwork	1 random field density test per 500 SF	C L
02318	Compaction for Utility Trench Backfill	1 random field density test per 100 feet; under roads, under walks, and where utility trenches are within 5" of a building foundation	C L
02220	CONSTRUCTION TOLERANCE MEASUREMENTS		
	Width of Roadways	measurement per 150 LF	c c
	Width of concrete flatwork	Provide measurements sufficient to determine compliance with configuration and layout and at locations designated by the Contracting Officer	c c
	Subgrade Elevation of Roadways	1 measurement per lane per 150 LF	c c
	Subgrade Elevations of Building Pad and Helipad	Same as Width	cc
02601	Gradation and quality of crushed aggregate from commercial source	Written Certification from manufacturer that material meets certification	C L
	Compaction of aggregate base or surface course	1 Proctor test per gradation and material type	CL

	Compaction of aggregate base or surface course for Roadways	1 random field density test per lane per 150 LF	CL
	Compaction of aggregate base or surface course for Helipad	1 random field density test per 500 SF	CL
	Compaction of aggregate base or surface course for concrete flatwork	1 random field density test per 500 SF	CL
	Aggregate base and surfacing depths for Roadways	1 measurement per lift per lane per 150 LF	cc
	Aggregate base and surfacing depths for Helipad and Parking Lots	Provide 1 measurement per lift per 500 of centerline or defined reference line	cc
	Aggregate base and surfacing depths for concrete flatwork	Provide 1 measurement per 500 SF	cc
02602	Asphalt Concrete compaction for Roadways	1 Measurement per 150 LF.	
02660	Test for pressure and leakage	Test procedure outlined in individual section	cc
02675	Waterline disinfection Chlorine Residual Bacteriological	Test procedure outlined in individual section FINAL TEST	cc Contracting Officer
02602	Asphalt Concrete Compaction for Helipad and Parking Lots	1 Random field density test per 500 SF	cc
03300	Mix Design Certification	1 per composition and breaking strength	CL
03300	Strength Test	Minimum 2 tests per truckload	CL
03300	Slump and air entrainment	1 test per truckload	cc

15500	Test for pressure and leakage	Test with Regulatory Agency	cc
16050	Test for Voltage in Each Outlet	Procedure outlined in individual section	cc
07610	Roof Leak Test	8 gpm *I* sq.ft. of roof 2 gal. / sq.ft. of roof	cc
09960	Coating preparation, coating application, curing	test and inspect per manufacturer's Instructions	**MR**
09960	Tank coating leak test	Visual inspection 24 hour period	cc
15010 15030 15040	Tank leak test	Visual inspection 24 hour period	cc
15030	Bolted tank construction	On site certified installers	cc

3.3 RECORDS OF INSPECTION, TESTS, & MEASUREMENT

A. Inspection and Tests:

a. The Contractor shall maintain current records of all inspections and tests performed. The following format or one containing the following information will be acceptable to the Government:

i. Project No. Contract No.

ii. Bid Item No. Date Station Measurement (Initials)

b. The Contractor shall certify in writing that all inspections and tests were performed in accordance with specifications. A copy of the inspection and test records shall be submitted with the written certification.

3.3 CERTIFICATIONS & MEASUREMENTS

A. Offsite Produced Materials:

a. The Contractor shall furnish certificates executed by the manufacturer, supplier, or vendor, stipulating that all offsite produced materials incorporated into the work meet the applicable requirements SHOWN ON THE DRAWINGS or stated in the specifications.

b. All certifications shall be the original. The certifications shall name the appropriate item of equipment or material, specification, standard, or other document specified as controlling the quality of that item and shall have attached thereto certified copies of test data upon which the certifications are based.

c. The Contractor shall certify incidental purchases needed to remedy minor shortages of material.

B. Quantity Measurements:

a. The Contractor shall make all measurements for computation of quantities for all work items except those specified for payment by Contract Quantity (CQ).

b. The Contractor shall compute the quantities for periodic progress payments; the Contracting Officer will compute the quantities for the final payment based on measurements taken by the Contractor.

c. All Contractor measurements are subject to verification.

d. The Contractor shall submit all field notes, calculation sheets, and other data used to determine quantities.

e. The Contractor shall certify the accuracy of the measurements and computations submitted in writing.

C. The following format or one containing the following information will be acceptable to the Government:

a. Project No. Contract NQ.

b. Bid Item No. Date Station Measurement (Initials)

END OF SECTION

SECTION 01524 CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

a. Special requirements for waste management during construction operations.

i. Protect the environment, both on-site and off-site, during construction operations.

ii. Prevent environmental pollution and damage.

iii. Maximize source reduction, reuse and recycling of solid waste.

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

1.3 QUALITY ASSURANCE

A. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.

B. Diversion Goals: A minimum 75 percent by weight of total project solid waste to be diverted from landfill.

1.4 PRECONSTRUCTION MEETING

A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with the Contractor and the Contracting Officer to discuss the proposed Waste Management Plan and to develop mutual understanding relative to details of environmental protection.

1.5 SUBMITTALS

A. Solid Waste Management Plan: Not less than 10 days before the Pre-construction meeting, prepare and submit a Solid Waste Management Plan including, but not limited to, the following:

   a. List of the recycling facilities, reuse facilities, municipal solid waste landfills and other disposal area(s) to be used. Include:

      i. Name, location, and phone number.

      ii. Copy of permit or license for each facility.

   b. Identify materials that cannot be recycled or reused. Provide explanation or justification.

   c. Revise and resubmit Plan as required by The Contracting Officer.

      i. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Progress Documentation: Document solid waste disposal and diversion. Include the quantity by weight of waste generated; waste diverted through sale, reuse, or recycling; and waste disposed by landfill or incineration. Identify landfills, recycling centers, waste processors, and other organizations that process or receive the solid waste.

   a. Document on form in Appendix A of this Section, or similar form as approved by The Contractor.

   b. With each request for Payment, submit updated Documentation for solid waste disposal and diversion.

   c. With each request for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

3.1 SOLID WASTE MANAGEMENT

A. Develop and implement a waste management program in accordance with ASTM E1609 and as specified herein.

B. Collection: Implement a recycling/reuse program that includes separate collection of waste materials of the following types as appropriate to the project waste and to the available recycling and reuse programs in the project area:

    a. Land clearing debris.

    b. Asphalt.

    c. Concrete and Masonry.

    d. Metal.

        i. Ferrous.

        ii. Non-ferrous.

    e. Wood, nails and staples allowed.

    f. Debris.

    g. Glass, colored glass allowed.

    h. Paper.

        i. Bond.

        ii. Newsprint.

iii. Cardboard and paper packaging materials.

iv. Plastic.

v. Gypsum.

vi. Non-hazardous paint and paint cans.

vii. Carpet.

viii. Insulation.

ix. Others as appropriate.

x. Recycling/Reuse: Maximize recycling and reuse of materials.

xi. Recycling/Reuse off project site: The following is a partial list for Contractor's information only. For more information, contact the State Department of Environmental Quality and the local Integrated Solid Waste Management Office.

1. Habitat for Humanity, a non-profit housing organization that rehabilitates and builds housing for low-income families. Sites requiring donated materials vary. Contact the national hotline (800) HABITAT.

2. California Materials Exchange (CAL-MAX) Program sponsored by the California Integrated Waste Management Board; (916) 255-2369.

Handling:

Clean materials that are contaminated prior to placing in collection containers. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process).

Arrange for collection by or delivery to the appropriate recycling or reuse facility.

Appendix A

Summary of Solid Waste Disposal and Diversion

Project Name:				Project Number:	
Contractor Name:				License Number:	
Contractor Address:					
Solid Waste Material	**Date Material Disposed / Diverted**	**Amount Disposed / Diverted** (ton or cubic yard)	**Municipal Solid Waste Facility** (Name, Address, & Phone Number)	**Recycling/ Reuse Facility** (Name, Address, & Phone Number)	**Comments** (if disposed, state why not diverted)
Appliances					
Asphalt					
Cardboard					
Concrete					
Gypsum Drywall					
Land Clearing/ Soil					
Masonry					
Metals: Ferrous					
Metals: Non-Ferrous					
Mixed/ Co-mingled Waste					
Plastic					
Roofing: Asphalt-based					
Salvaged/ Surplus					
Materials for Reuse					
Wood: Landclearing Debris					
Wood: Scrap Lumber					
Other:					
Signature:			Date:		

END OF SECTION

SECTION 01711 CLEANUP AND DISPOSAL

PART 1 - GENERAL

1.1 SCOPE

A. This work consists of cleanup and disposal of refuse and excess material resulting from construction operations.

1.2 MEASUREMENT AND PAYMENT

B. No separate measurement or payment will be made for work specified in this Section.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 EXCESS MATERIALS AND REFUSE

A. The Contractor shall remove all refuse and unused materials generated by his operations including, but not limited to, wood, asphalt, concrete, vegetative materials, unused equipment , and the like from the project site and disposed of off National Forest land in accordance with local regulations.

3.2 SALVAGEABLE ITEMS

A. Salvageable items not intended for use in this contract, and not specifically designated to remain the property of the Government, shall become the property of the Contractor.

END OF SECTION

SECTION 01741 MANUFACTURER'S WARRANTIES

PART 1 - GENERAL

1.1 SCOPE

A. This work consists of the assignment of manufacturer's warranties for products incorporated into the work.

1.2 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for the work specified in this section.

PART 2 - PRODUCTS

A. All products offered with manufacturer's warranty furnished, installed, or constructed in this contract, including but not limited to valves, hydrants, pressure reducers, backflow preventers, water gauges, float switches, meters, tank coatings and water tanks.

   a. Bolted steel tanks and high performance liners for tanks

   b. All electrical devices, including but not limited to switch, transformers, distribution panels, control devices, panels, and the like.

PART 3 - EXECUTION

3.1 MANUFACTURER'S WARRANTIES

A. All manufacturer's warranties shall be executed in the name of the: Facilities Manager – Engineering Angeles National Forest 701 N. Santa Anita Ave. Arcadia, CA 91006

B. The contractor shall file the original copy of each manufacturer's warranty in a loose leaf binder. The binder shall be given to the Contracting Officer at, or prior to the Final Inspection.

END OF SECTION

SECTION 02318 EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies excavation and backfill for utilities, including excavation; furnishing, hauling and placing of backfill material; disposal of excess or unsuitable backfill material; and grading.

1.2 RELATED SECTIONS

A. 02511 - Water Distribution System

1.3 SUBMITTALS

A. The Contractor shall provide submittals in accordance to Section 01300 and shall include:

B. Certification, test results, source and samples for all imported material.

C. Required permits including haul, blasting, and encroachment permits.

D. Certification and test results for compaction of backfill

E. Construction plan and scheduling for construction activity that may require a delay or detour of pedestrian or motorized traffic.

1.4 UNDERGROUND UTILITIES AND OTHER UNDERGROUND IMPROVEMENTS

A. Underground utilities and other underground improvements exist at the site. The Contractor shall call 1-800-422-4133 toll free weekdays or call 818-357-2257 after 5 p.m. and weekends for the free utility location service. If a utility or other underground improvement is damaged, the Contractor shall notify the Contracting Officer and the Owner of the utility immediately.

B. When the utilities or other underground improvements are shown on the drawing, the locations are approximate. The Contractor shall take all reasonable precautions to protect the utilities or other underground improvements when the locations have been designated. If a utility or other underground improvement is damaged and it is within 5 feet of the location shown on the drawing or designated on the ground, the Contractor shall repair the damage to the satisfaction of the Contracting Officer or Owner at the Contractor's expense. All repairs necessary shall be made immediately unless directed otherwise in writing by the Contracting Officer.

C. If a utility or other underground improvement is damaged and was not located or is beyond 5 feet of the location shown on the drawing or designated on the ground, the Differing Site Conditions Clause (FAR 52.236-2) applies. If the damaged utility is unsafe or is causing other damage, the Contractor shall take necessary precautions or make temporary repairs to provide for the safety of personnel and to prevent further damage.

1.5 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work specified in this section. Payment will be included as part of the contract price for other items of work.

B. Measurement for excavation and backfill of utilities will be paid for under section 02511, Water Distribution.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Materials shall be free of frozen or organic material.

a. CLASS A: Top Soil

i. Material shall be generated from the surface material to a depth of 6 to 8 inches

b. CLASS B: Select Soil

i. Excavated material containing no rocks larger than 6 inches in largest dimension.

c. CLASS C: Fines

i. Fine soil or clean sand, 100 percent passing the #4 Topsoil.

PART 3 - EXECUTION

3.1 WORKING LIMITS

A. Unless otherwise noted, excavation and backfill operations shall be confined to within the clearing limits. Where clearing limits are not specified, excavation and backfill operations shall be limited to a 25 foot wide strip contiguous to the utility centerline.

3.2 CONSTRUCTION

A. Excavation

a. Excavation shall not begin until all clearing and grubbing work is completed except for final debris disposal.

b. Trench alignment will be designated on the ground by the Contracting Officer. Slight variances in alignment will be allowed when approved by the Contracting Officer.

c. Bedding material and utility shall not be placed until the bottom of the trench has been approved by the Contracting Officer.

d. Unless otherwise noted, trench for utility shall be kept to a minimum width to minimize disturbance to the ground.

e. Unless otherwise noted, depth of trench shall be that necessary to provide 36 inch minimum cover over waterline for trenches with single utility installation.

f. Unless otherwise noted, depth of trench shall be that necessary to provide 30 inch minimum cover over electrical control wires for single utility installation.

g. The depth of trenches carrying more than one utility shall be excavated to a depth which will allow the proper separation of utilities in accordance with Section 02511, Water Distribution.

h. Lay utilities in continuous open trench. Short tunnel sections or boring may be used in special locations with the approval of the Contracting Officer.

B. Over excavation.

a. Restore to grade any over excavation by backfilling with select material.

C. Salvage of Topsoil.

a. Excavate top 6 to 8 inches of surface material and stockpile separately for use as topsoil backfill material.

D. Wet Excavation.

a. If water is encountered during trench excavation, provide adequate pumping equipment and piping to keep trench free from water and dispose of the water without damage to adjacent property. Separate payment will not be made for pumping of water from trenches or for excavation of material rendered unsuitable as a result of water encountered. Unsuitable Material.

b. Where unsuitable material is encountered in the trench bottom, as determined by the Contracting Officer, excavate the trench below grade to the depth specified by the Contracting Officer.

E. Rock Excavation and Blasting.

a. Blasting for excavation will be permitted when proper precautions are taken for the protection of persons and property. Notify the Contracting Officer of blasting schedule a minimum of 48 hours prior to commencing blasting operations.

b. Any damage caused by blasting shall be repaired at the Contractor's expense. The methods or procedure shall conform to State laws and regulations.

F. Backsloping, Sheeting and Shoring.

a. Backsloping of trench walls will be allowed only upon prior written approval of the Contracting Officer.

b. Remove all shoring and sheeting when construction is completed. Withdraw to prevent trench wall caving while backfilling.

G. Backfill Requirements

a. Do not place backfill until installation of pipe or cable has been approved by the Contracting Officer.

b. Before compacting backfill other than rock or sand, prepare material to a water content that will permit proper compaction by either aerating the material if it is too wet, or spraying the material with water if it is too dry. Thoroughly mix each lift before compaction to assure uniform distribution of water content. Do not compact material above pipe or cable until there are 6 inches of cover over the pipe or cable.

c. Cross Country and Undeveloped Areas

i. Class A: Top 6 inches of backfill shall be Class A (Top soil) compacted s to a density equal to or greater than the adjacent disturbed surface. Final finished surface shall be mounded 4 inches above trenched area to allow for settlement.

ii. Class B: Material between Class A {Top Soil) and Class C (Fines) shall be placed in lifts 6 inches or less and compacted to a density equal to or greater than the adjacent undisturbed soil.

iii. Class C: Material for bedding and backfill around utility line shall be Class C (Fines). The combined bedding and backfill shall provide a minimum 6 inches of Class C material around the perimeter of the utility line. The material shall be compacted to a density of not less than

90 percent of the maximum density determined by AASHTO Tl 80, **method C or D.**

H. Under Roads and Structures

a. The compaction for trench backfill under roads, asphalt and concrete structures shall be not less than 90 percent of the maximum density determined by AASHTO Tl 80, Method C or D, except for the top 12 inches which shall be compacted to 95 percent of AASHTO Tl 80, Method C or D.

b. The area requiring Class C (Fines) shall be the same area as for Cross Country installation compacted to not less than 90 percent of AASHTO Tl 80, Method C or D.

I. Damage to existing underground utilities.

a. Stop all work associated with damage to existing utilities, and notify the Contracting Officer. Repair utility as directed by the Contracting Officer.

b. Repair at Contractor's expense underground utilities that are within 5 feet of where shown on Drawings or designated on the ground, and damaged by the Contractor.

c. Repair at Government expense underground utilities not shown on Drawings or not designated on the ground or not within 5 feet of where shown on the Drawings or designated on the ground, and damaged by the Contractor.

J. Special Surface Restoration.

a. Unless otherwise noted, replace all surfaces disturbed by trenching operation in kind.

i. Asphalt surfaces shall be replaced in accordance with Section 02700, Asphalt Pavement Patching.

ii. Concrete surfaces designated for removal shall be saw cut and replaced in accordance with Section, 03300, Cast -In-Place Concrete. Concrete finish, color, and edging shall be same as adjoining slab.

iii. Sod designated for removal and reuse shall be watered down and kept moist until ready for placement. Lower grade to allow compacted sod to match existing undisturbed grade. Place a 2 inch layer of compacted topsoil between the top backfill lift and sod. Compact sod in place with a 200 to 250 pound hand roller.

3.3 CLEANING

A. Final Finish.

a. After the utility installation and backfill has been completed, finish all disturbed areas, except trench area required to be mounded, to a smooth, uniform grade and texture, well blended to the original contours, showing minimum evidence of construction activity. Excess excavation shall be hauled to a disposal site shown on the drawing or designated on the ground by the Contracting Officer.

3.4 SCHEDULES

A. Contractor shall expedite backfilling open utility line trenches located in existing roadways, parking areas, driveways, and pathways. Contractor's scheduling for operations causing traffic disruption shall be approved by the Contracting Officer prior to implementation.

END OF SECTION

SECTION 02511 WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

This Section includes the installation of waterlines, meters, valves and appurtenances for new and reconstructed potable-water systems.

1.2 DEFINITIONS

A. Abbreviations

a. RS Rising Stem

b. NRS Non-rising stem

c. WOG Water, Oil, and Gas

1.3 SUBMITTALS

A. Submit sufficient descriptive literature in accordance with Section 01300, Submittals, to demonstrate compliance with these specifications for each type and component being furnished.

B. Operation and maintenance data shall be included for the following:

a. Water meters.

b. Valves.

c. Backflow preventers.

C. Plumbing Layout

a. Schematic layout for all plumbing in well head enclosures.

b. Schematic layout for all plumbing in water tanks.

c. Schematic layout for all plumbing in distribution system and valve boxes.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

a. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.

b. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

c. Comply with local County Environmental Health Services Requirements. Work under this contract will be in Los Angeles County.

d. All piping and components used in contact with drinking water shall comply with ANSI/NSF 61, Drinking Water System Components-Health Effects.

e. Piping materials shall bear label, stamp, or other markings of specified testing agency.

f. Plastic pipe and components shall be marked with NSF certification for potable water.

g. All plastic pipe and components shall comply with ANSI/NSF14, Plastic Pipe Components and Related Materials.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Working Pressures: The following are minimum pressure requirements for piping and specialties, unless otherwise indicated:

a. Potable-Water Service: 125 psig.

1.6 PROJECT CONDITIONS

A. Existing utilities shall not be disrupted or turned off without written approval from the Contracting Officer. Unless otherwise noted, the Contractor shall provide temporary utility service prior to the interruption of service. Temporary service shall be provided until the permanent service is restored.

1.7 DELIVERY, STORAGE, AND HANDLING

A. 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.

   a. Protect flanges, fittings, and specialties from moisture and dirt.

   b. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Coordinate connection to water main with utility company.

B. Coordinate and schedule work activity with contracting officer to reduce conflicts with utility disruptions. In addition to written plans and schedules, the contractor shall notify the contracting officer 48 hours in advance of any utility disruptions. Utility service shall not be disrupted without approval from the Contracting Officer.

1.9 MEASUREMENT AND PAYMENT

A. METHOD OF MEASUREMENT

   a. The completed item will be measured as set forth in the Schedule of Items.

   b. No deduction will be made for pipe length taken up by valves, meters, or fittings.

c. Measurement will stop at the water storage tank limit.

d. Measurement will include trenches and backfill including combination of utilities listed on the Schedule of Items.

e. Items of work not shown in the Schedule of Items will not be measured for payment and will be considered incidental to other Pay Items.

B. PAYMENT

a. Payment will be made at the Contract unit price for each type of component including backfill and excavation as set forth in the Schedule of Items, which will include all materials, labor, equipment, disinfection, appurtenances and incidentals necessary to complete the work specified in this Section.

b. Trenches and backfills will not be paid for separately and will be considered incidental to other Pay Items.

c. Items of work not shown in the Schedule of Items will not be paid for separately and will be considered incidental to other Pay Items.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless otherwise noted, all waterlines, pipes, valves, fittings, meters, switches, and all other water system products and materials shall be new and unused, of the type, pressure rating or class, and size specified and as shown on the drawings, and NSF (National Sanitation Foundation) 61 approved for use in potable drinking water systems.

2.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. Pipe

a. HDPE plastic pipe shall be PE-3408 as defined in ASTM D1248, with a minimum cell classification of 345464C in accordance with ASTM D3350.

The pipe shall be SDRl 1, 160 psig minimum pressure rating and comply dimensionally with ASTM D3035.

b. Pipe shall be manufactured in accordance with AWWA C901 for sizes½" through 3".

c. HDPE pipe larger than 2" diameter shall be provided in 40-foot lengths rather than rolls. HDPE pipe 2" and smaller shall be provided in rolls.

d. The joining method shall be butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. Butt fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer, including but not limited to, temperature requirements, alignment, and fusion pressures. Ribbed steel inserts with stainless steel clamps are not approved for HDPE pipe.

e. The HDPE pipe shall be Geo-Flo as manufactured by PW Poly, Hastings, NE, **(888)** 437-9919 or Cen Fuse Pipe as manufactured by Centennial Plastics LLC, Hastings, NE (866) 851-2227 or approved equal and supplied by Grand Junction Pipe and Supply, Grand Junction, Colorado (970) 243-4604.

B. Fittings

a. HDPE fittings shall be made from material meeting the same requirements as the pipe.

b. Molded fittings shall be manufactured in accordance with either ASTM D2683 for socket fused or ASTM D3261 for butt fused and shall be so marked.

c. All HDPE fittings shall have the same or higher pressure rating and compositions.

d. HDPE elbows, tees and reducers shall be as manufactured by Central Plastics Co., Shawnee, OK, (800) 654-3872 or approved equal, and as supplied by Grand Junction Pipe and Supply, Durango, CO **(888)** 385-6733.

2.3 GALVANIZED STEEL PIPE (GSP)

A. ASTM A53 for Pipe

a. Pipe 4-inch diameter and smaller. Schedule 40.

b. Plain ends for joining with standard manufactured couplings.

c. Threaded ends shall meet requirements of ASME Bl.20.1.

B. Fittings

a. ASTM A53. Schedule 40.

b. For threaded ends use Teflon thread sealing tape.

2.4 MECHANICAL-JOINT, DUCTILE-IRON PIPE

A. AWWA C151, with mechanical-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

a. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

b. Glands, Gaskets, and Bolts: AWWA Cl 11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.5 PUSH-ON-JOINT, DUCTILE-IRON PIPE

A. AWWA C151, with push-on-joint, bell- and plain-spigot end unless grooved or flanged ends are indicated.

a. Push-on-Joint, Ductile-Iron Fittings: AWWA Cl 10, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

b. Gaskets: AWWA C111, rubber.

2.5 PVC, SCHEDULE PIPE

A. PVC Schedule 40 Pipe:

a. ASTM 1785.

b. PVC, Schedule 40 Socket Fittings: ASTM D 2466.

B. PVC, Schedule 80 Pipe: ASTM D 1785.

a. PVC, Schedule 80 Socket Fittings: ASTM D 2467.

2.7 PVC, AWWA Pipe

A. AWWA C900, Class 150 and Class 200, with bell end with gasket and spigot end.

a. Comply with UL 1285 for fire-service mains if indicated.

b. PVC Fabricated Fittings: AWWA C900, Class 150 and Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

c. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

2.8 PVC, Pressure Rated Pipe (SDR series)

A. Pipe shall conform to ASTM D1784 and D2241.

B. Pipe shall bear NSF seal of approval for potable water applications.

C. Pipe shall be SDR 13.5 pressure classification with a maximum working pressure of 315 psi.

D. Joints to be integral bell utilizing Rieber gasket system for sealing, meeting ASTMF477.

2.9 COUPLINGS FOR SIMILAR OR DISSIMILAR PIPE

A. Compression type transition fittings for making connections between like and dissimilar pipe materials shall be designed to enable a variety of connections between polyethylene pipes to various pipes. Fittings shall be Cepex performance series compression fittings as manufactured by Cepex Holding, S.A. and distributed by The Lateral Connection Corp., Sparks, NV 89434 (775) 626-6777 or approved equal and supplied by Ferguson Waterworks, Denver, CO, (303) 571- 4444 or approved equal.

2.10 PIPE SLEEVE

A. PVC, Schedule 80 Pipe: ASTM D 1785.

   a. PVC, Schedule 80 Socket Fittings: ASTM D 2467.

2.11 FLAT STEEL SUCTION STRAINER

A. Zinc plated, 16-gauge, cold-rolled steel strainer with threaded end to attach to GSP pipe, part SSS6, as manufactured by Campbell Manufacturing, Inc., Bechtelsville, PA, (800) 523-0224 or approved equal.

2.12 INSECT SCREEN

A. 24-mesh woven wire cloth, type 304 stainless steel standard grade, non- corrodible.

2.13 RIPRAP AT DAYLIGHT DRAIN

A. Riprap shall consist of hard, dense, durable stone, angular in shape and resistant to weathering. Rounded stone or boulders will not be accepted as riprap material. Individual stones shall have dimensions of 6" to 12". Source of stone shall be from rocks uncovered on site during construction operations or from a commercial source.

2.14 CURB STOP

A. One-piece, closed-bottom body with tee head and plug integrally cast, 0-ring sealed design, and 175 psig maximum working pressure.

a. Minneapolis pattern.

b. Female iron pipe inlet by female iron pipe outlet.

c. Hole for attaching curb box rod or handle in provided in tee head.

d. Heavy cast bronze body construction conforming to AWWA C800.

B. Curb stops shall be Mueller 300 Ball Curb Valve, sized for pipe diameter and material, both ends female threaded with Minneapolis patter top, model number B20287, as manufactured by Mueller Co., Decatur, Illinois, (800) 423-1323, or approved equal.

C. Curb stops shall be 300 psig Ball Curb Stops, sized for pipe diameter and material, both ends female threaded with Minneapolis pattern top, model number 6105, as manufactured by A.Y. McDonald, Mfg., Co., Dubuque, Iowa, (800) 292-2737, or approved equal.

2.15 CURB BOX

A. Extension type curb box with threaded Minneapolis pattern base, cast iron base, steel pipe telescoping upper section.

B. Curb boxes shall be manufactured by the same company as the curb stop and sized to fit curb stop.

C. Lids shall be two-piece, cast iron with brass pentagon plug and have lettering "WATER" permanently imprinted on them.

D. Box shall be equipped with stationary rod. The rod length shall be within 12 inches of the top of the box.

E. Curb box, complete with lid and stationary rod, shall be Minneapolis style, series number 5610 for 1" valves, series number 5611 for 2" valves, length as needed, as manufactured by A.Y. McDonald Mfg., P.O. Box 508, Dubuque, Iowa, (800) 292-2737, or approved equal.

F. Curb box, complete with lid and stationary rod, shall be extension type with Minneapolis pattern base, model H-10332 for 1" valves, and model H-10332- 99000 for 2" valves,

length as needed, as manufactured by Mueller Co., Decatur, Illinois, (800) 423-1323, or approved equal.

2.16 CORPORATION VALVES AND CURB VALVES

A. Available Manufacturers:

a. Amcast Industrial Corporation; Lee Brass Co.

b. Ford Meter Box Company, Inc. (The).

c. Grinnell Corporation; Mueller Co.; Water Products Div.

d. Jones, James Company.

e. Master Meter, Inc.

f. McDonald, A. Y. Mfg. Co.

g. Red Head Manufacturing Co.

B. Service-Saddle Assemblies:

a. Comply with AWWA C800. Include saddle and valve compatible with tapping machine.

b. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.

c. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.

C. Curb Valves:

a. Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service-piping material

D. Service Boxes for Curb Valves:

a. Similar to AWWA M44 requirements for cast- iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," bottom section with base of size to fit over curb valve, and approximately 3-inch diameter barrel.

b. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

2.17 GATE VALVES UNDER 3 INCHES:

A. ASTM B62, Bronze.

B. Threaded connection.

a. RS, 125 pound, wedge disk; Crane 428, Jenkins 47 or approved equal.

b. NRS, 125 pound, wedge disk; Crane 438, or approved equal.

C. Flanged connection.

a. RS, 150 pound, wedge disk; Crane 429, Lunkenheimer 2157 or approved equal.

b. NRS, 150 pound, wedge disk; Crane 437, Jenkins 670 or approved equal.

2.18 GATE VALVES 3 INCHES AND OVER:

A. AWWA C509, Iron body, bronze core.

B. Threaded connection.

a. RS, 200 pound double disk, hand wheel.

b. NRS, 200 pound double disk, operating nut.

C. Flanged connection.

a. RS, 200 pound double disk, hand wheel.

b. NRS, 200 pound double disk, operating nut.

2.19 GLOBE VALVES

A. Globe Valves: 3 inches and under.

a. ASTM B62Bronze.

b. Threaded end connection

1. 125 pound, metallic disk; Stockham B-16, Crane 1, or approved equal

2. 125 pound, nonmetallic disk; Stockham B-13T, or approved equal.

c. Flanged end connection.

1. 150 pound, metallic disk; Lunkenheimer 16, or approved equal.

B. Angle Valves: 2 inches and under.

a. ASTM B62Bronze.

b. Threaded end connection.

1. 125 pound, metallic disk; Lunkenheimer 2141, or approved equal.

2. 150 pound, nonmetallic disk; Stockham B-222, Crane 17, Lunkenheimerl 7 or approved equal.

c. Flanged end connection.

1. 150 pound, metallic disk; Powell 1219 or approved equal.

C. Swing Check Valves: 2 inches and under.

a. Flanged end connections, Bronze, 150 pound, metallic disk; or approved equal.

D. Swing Check Valves: 3 inches and under.

a. ASTM B62Bronze.

b. Threaded end connection.

1. 125 pound, metallic disk; Crane 37, Stockham B-319Y, or approved equal

2. 125 pound, nonmetallic disk; Crane 41, or approved equal.

E. Swing Check Valves: Over 3 inches.

a. Iron body, bronze mounted swing check, renewable bronze disk and seat ring, bolt cover, with 200 psi WOG flange end connection.

b. All iron body swing check, renewable iron disk, and bolt cover, with 200 psi WOG flange end connection.

c. Iron body, bronze mounted swing check composition disk, and bolt cover, with 200 psi WOG flange end connection.

F. Lift Check Valves: 3 inches and under.

a. ASTM B62, Bronze.

b. Threaded end connection.

1. Metallic disk; Stockham 316, or approved equal.150 pound, nonmetallic disk; Crane 27, or approved equal.

c. Flanged end connection.

1. 200 pound, metallic disk; Stockham B-335, or approved equal.

G. Lift Check Valves: Over 3 inches.

a. Iron body bronze mounted lift checks, renewable composition disk, bronze ring, bolted cover, 200 psi nonshock WOG.

H. Silent Check Valves.

a. Body: Iron or semi-steel.

b. Pressure Rating: 125 pound or 250 pound as specified.

c. Trim.

1. Bronze, with center guided post and resilient seat.

2. Stainless steel, with center guided post and resilient seat.

d. Inserts: Resilient elastomer.

e. Spring: Stainless steel.

f. End Connections.

1. Threaded.

2. Flanged.

3. Compact type for placement between flanges.

I. Ball Check Valve.

a. A nonclog sinking type ball check valve for horizontal or vertical operation in domestic sewage. Design valve such that the ball is out of liquid flow when the valve is open. Ball to move freely in housing and not to experience concentrated wear. Guide ball to and from seat by smooth ribs cast into valve body. Valve body interior to have no projections or pockets to trap solids or stringy material. Valve cover to be removable for cleaning and ball inspection or replacement.

1. Valve Body.

i. Cast iron with ANSI Class 125 flat faced flanges for valves 2 inches and over. Bronze body and cap for valves under 2 inches with threaded connections.

2. Ball.

i. Sinking type hollow steel ball with vulcanized nitril rubber coating. Coating to be resistant to grease, petroleum products, animal and vegetable fats, dilute concentrations of acids and alkalies (pH 4 - 10), tearing and abrasion; have a high load bearing capability and low compression set.

J. Pressure Relief Valves.

a. Code: ASME Listed.

b. Size: 3/4 inch.

c. Body: Bronze. 4.

d. Spring: Stainless Steel.

e. Pressure Setting Range: 30 to 125 psi.

K. Pressure Reducing Valve: 2 inches and under.

a. Body: Bronze.

b. Pressure Rating: Minimum 150 pounds.

c. Strainer.

L. Pressure Reducing Valve: Over 2 inches.

a. Valve: Pilot operated.

b. Body: Cast Iron ASTM A48. 3.

c. Trim: Bronze.

d. Pressure Ratings.

1. 125 Class.

2. 250 Class.

e. End Connection.

1. Flanged.

M. Valve Rods.

a. Materials: Galvanized iron or steel.

b. Minimum length shall be measured from the top of the deepest operating nut to the top of the valve box cover plus three feet.

c. Operating Nut: 2 inch square by 1-3/4 inch high.

N. VALVE, ELECTRICAL, AND METER BOXES

a. Valve box with Rings

b. Quazite, manufactured by Hubbell, Lenoir City, Inc., or approved equal.

c. Cover to be marked with utility type, traffic rated, and lockable.

2.20 TOOLS FOR OPERATING GATE VALVES, CURB STOPS

A. The Contractor shall supply four curb box pentagon keys, and two gate valve operating wrenches to operate valves and curb stops. Tools shall be as supplied by the valve, curb stop, or box manufacturer.

B. Curb box keys shall be supplied to the CO. Keys shall be model number 304B, 3 foot length, as manufactured by A.Y. McDonald Mfg., P.O. Box 508, Dubuque, Iowa, (800) 292-2737, or approved equal.

C. Five combination keys to operate stationary rods and pentagon screw on lids shall be supplied to the CO. Keys shall be model number H-10356, 3 foot length, as manufactured by Mueller Co., Decatur, Illinois, (800) 423-1323, or approved equal.

D. Gate valve operating wrench shall be model A-24610, 5" in length, tooperate gate valves, as manufactured by Mueller Co., Decatur, IL, phone (800) 423- 1323; or approved equal.

2.21 MJ ADAPTER

A. Transition fitting between 3-inch diameter mechanical joint end on gate valve to 3-inch diameter polyethylene pipe.

B. Fusion fitting shall be a PE3408 butt fusion fitting manufactured in compliance with ASTM D3261 for the IPS pipe side in.

C. Fitting shall be an MJ Adapter as manufactured by Central Plastics Company, Shawnee, OK, (800) 654-3872 and supplied by Mountain States Pipe and Supply, Colorado Springs, CO, (719) 634-5555 or approved equal.

D. Air Release Valves.

a. Automatic valve with ball float and lever action closing system.

1. Size.

i. 3/4 inch.

ii. 1 inch.

b. Float: Stainless steel.

c. Internal Parts: Corrosion resistant metal.

d. Orifice: 3/32 inch minimum.

e. Outlet: 3/8 inch minimum

2.22 AIR AND VACUUM VALVE

A. Air and Vacuum Valve

a. Valve shall operate by sealing the BUNA-N rubber outlet seat with a peripheral float as the liquid enters the valve chamber to raise the float. The valve shall satisfactorily withstand hydrostatic pressures of 300 psig. Cast iron body, top flange with brass trim,½" NPT screwed inlet and outlet. Crispen A-

5 valve, color beige, low pressure 2-40 psi, as manufactured by Multiplex Manufacturing Co., Berwick, PA (800) 247-8258 or approved equal.

B. Vent

a. Aluminum double outlet tank vent, ¾" t-style, with 20 mesh stainless steel screen. FIG 155 tank vent as manufactured by Morrison Bros., Dubuque, IA, (800) 377-5453 or approved equal as supplied by F.W. Jones, Inc., Murray, Utah, (801) 266-2545.

C. Anti-siphon Vacuum Breaker

a. Hose connection type anti-siphon vacuum breaker meeting the requirements of ANSI Al 12.1.1, ASSE Standard 1011. Vacuum breaker Watts Series 8, with Allen head screw.

D. Air Release Valves

a. Automatic valve with ball float and lever action closing system.

1. Size.

i. ¾ inch.

ii. 1 inch.

b. Float: Stainless steel.

c. Internal Parts: Corrosion resistant metal.

d. Orifice: 3/32 inch minimum.

e. Outlet: 3/8 inch minimum.

2.23 UNDERGROUND DETECTION AND MARKING TAPE

A. MARKINGTAPE:

a. OVER METALLIC UTILITY - Marking tape in trenches over metallic utilities shall be a 4 mil thickness of inert plastic film. The tape shall be brightly colored to contrast with soil and shall bear an imprint identifying the type of line buried below.

b. OVER NON-METALLIC UTILITY - Marking tape in trenches over non-metallic utilities shall be an inert plastic film as described above bonded to a 1-1/2 mil metallic backing.

B. TRACING WIRE:

a. Tracing wire shall be installed on all water lines. The wire shall be a UF #12 copper wire fastened to the water line at six feet on center by an approved means.

b. Clamp tracer wire to outlet drains, hydrants, curb stops, gate valves, metallic piping, and air/vacuum valves with ground clamps sized for pipe at appurtenance.

2.24 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, BCuP Series.

B. Soldering Flux: ASTM B 813, water-flushable type.

C. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.

2.25 TAPPING-SLEEVE

A. Comply with MSS SP-60. Include sleeve and valve compatible with drilling machine. Available Manufacturers:

a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.

b. East Jordan Iron Works, Inc.

c. Grinnell Corporation; Mueller Co.; Water Products Div.

d. International Piping Services Company.

e. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).

f. McWane, Inc.; Kennedy Valve Div.

g. McWane, Inc.; M & H Valve Company Div.

h. United States Pipe and Foundry Company.

B. Tapping Sleeve: Cast- or ductile-iron or stainless steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.

C. Valve: AWWA, cast-iron, nonrising-stem, resilient or metallic seated gate valve with one raised face flange mating tapping-sleeve flange.

D. Vertical-Type Indicator Posts: UL 789, FM-approved, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.26 WATER METERS

A. Available Manufacturers: ABB Water Meters, Inc.

a. Zenner Potable Water Meter Displacement Type Magnetic Drive, or approved equal from other manufacturer listed.

b. Badger Meter, Inc.

c. Carlon Meter Co.

d. Grinnell Corporation; Mueller Co.; Hersey Meters.

e. ROMAC Industries, Inc.; Hays Fluid Control Div.

f. Schlumberger Limited; Water Div.

g. Senses Technologies, Inc.

h. Water Specialties Corp.

B. Description: AWWA C700, ANSI/NSF Standard 61, displacement-type, bronze main case, frost proof. Register flow in US gallons, straight reading, unless cubic feet are indicated. Meters two inch and larger shall have flanged ends, companion flanges, gaskets with bolts and nuts.

C. Description: AWWA C702, compound-type, bronze case. Register flow in gallons (liters) unless cubic feet (cubic meters) are indicated.

D. Water meter boxes. Quazite fiberglass and aggregate composite mix as manufactured by Hubbell, Lenoir City, Inc., or approved equal.

2.27 BACK.FLOW-PREVENTION DEVICES

A. Available Manufacturers:

a. Ames Co., Inc.

b. Cla-Val Co.

c. CMB Industries, Inc.; Febco Div.

d. Conbraco Industries, Inc.

e. FLOMATIC Corp.

f. Grinnell Corporation; Mueller Co.; Hersey Meters.

g. Watts Industries, Inc.; Water Products Div.

h. Zurn Industries, Inc.; Wilkins Div.

B. General: ASSE standard, backflow preventers.

a. Working Pressure: 150 psig minimum, unless otherwise indicated.

b. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.

c. NPS 2-1/2 (DN 65) and Larger: Bronze, cast-iron, steel, or stainless steel body with flanged ends.

d. Interior Lining: AWWA C550 or FDA-approved, epoxy coating for backflow preventers having cast-iron or steel body.

e. Interior Components: Corrosion-resistant materials.

f. Exterior Finish: Polished chrome plate if used in chrome-plated piping system.

C. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

a. ASSE 1001, with floating disc and atmospheric vent.

D. Reduced-Pressure-Principle Backflow Preventers:

a. ASSE 1013 or AWWA C51 l, suitable for continuous pressure application.

b. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and pressure-differential relief valve with ASME Al 12.1.2, air- gap fitting located between two positive-seating check valves.

c. Maximum Pressure Loss: 12 psig through middle 1/3 of flow range.

E. Double-Check-Valve Backflow Prevention Assemblies:

a. ASSE 1015 or AWWA C510, suitable for continuous pressure application. Include outside screw and yoke gate valves on inlet and outlet, and strainer on inlet; test cocks; and two positive-seating check valve

b. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

F. Double-Check-Valve Backflow Prevention Assemblies:

a. UL 312, FM approved; with two UL 312, FM-approved, iron-body, 175-psig working-pressure, flanged-end check valves and two UL 262, FM-approved, iron-body, outside screw and yoke, flanged, 175-psig working-pressure gate valves.

b. Maximum Pressure Loss: 5 psig through middle 1/3 of flow range.

G. Antisiphon-Pressure-Type Vacuum Breakers:

a. ASSE 1020, suitable for continuous pressure application. Include shutoff valves, spring-loaded check valve, spring-loaded floating disc, test cocks, and atmospheric vent.

b. Maximum Pressure Loss: 5 psig middle 1/3 of flow range.

2.28 FREE STANDING FIRE HYDRANTS AND YARD HYDRANT

A. Dry-Barrel Fire Hydrants: UL 246, FM-approved, one NPS 4-1/2 (DN 115) and two NPS 2-1/2 (DN 65) outlets, 5-1/4-inch main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure, and 150-psig minimum working-pressure design.

B. Dry-Barrel Fire Hydrants: AWWA C502, one NPS 4-1/2 (DN 115) and two NPS 2 1/2 (DN 65) outlets, 5-1/4-inch main valve, drain valve, and NPS 6 (DN 150) mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant

shall have cast-iron body, compression-type valve opening against pressure and closing with pressure, and 150-psig minimum working-pressure design.

C. Lockable Anti-Siphon Yard Hydrant. ASSE 1052 Approved, Listed by IAPMO. Two independent check valves. Box-brass casting, 125 Psi. Model Y95, Woodford Mfg. Co. (or Approved Equal), 2 foot bury required.

D. Freezeless Yard Hydrant

a. 1-1/2" size; Woodford U150 or approved equal

b. 2" size; Woodford U200 or approved equal

c. ¾" size; Woodford Y2 or approved equal. All¾" hydrants shall be equipped with an approved vacuum breaker assembly at the hose connection.

E. Available Manufacturers:

a. American AVK Co.; Valves & Fittings Div.

b. American Cast Iron Pipe Co.; American Flow Control Div.

c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.

d. American Foundry Group, Inc.

e. East Jordan Iron Works, Inc.

f. Grinnell Corporation; Mueller Co.; Water Products Div.

g. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).

h. McWane, Inc.; Kennedy Valve Div.

i. McWane, Inc.; M & H Valve Company Div.

j. Troy Valve.

k. United States Pipe and Foundry Company.

F. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.

G. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.

H. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.

I. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

2.29 ANCHORAGES

A. Clamps, Straps, and Washers: ASTM A 506, steel.

B. Rods: ASTM A 575, steel.

C. Rod Couplings: ASTM A 197 (ASTM A 197M), malleable iron.

D. Bolts: ASTM A 307, steel.

E. Cast Iron Washers: ASTM A 126, gray iron.

F. Concrete Reaction Backing: Portland cement concrete mix, 3000 psig.

a. Cement: ASTM C 150, Type I.

b. Fine Aggregate: ASTM C 33, sand.

c. Coarse Aggregate: ASTM C 33, crushed gravel.

d. Water: Potable.

2.30 WYE STRAINER

A. 125 PSI, Cast iron, ASTM 126 or Cast Bronze, ASTM B62. Mesh size, standard perforation (T304SS).

PART 3 – EXECUTION

3.1 GENERAL

A. New and replacement pipes, meters, valves, valve boxes, and other regulating and controlling devices shall be installed in accordance with manufacturer's recommendation at locations shown on the drawing or as designated in the field by the Contracting Officer.

B. New buried water lines are intended to be in the same corridor as the line being replaced. If sections of the old waterline being replaced are encountered, the exposed section shall be cut below grade and the exposed section disposed of off National Forest land.

C. Water system components and associated parts which are visible and no longer needed due to their replacement under this contract, shall be removed and disposed of off National Forest land.

D. Unless otherwise noted, all plumbing above grade shall be galvanized steel or cast iron.

E. A five foot section of galvanized pipe shall be installed on both sides of tee connections where risers are installed off buried PVC lines.

F. A five foot section of galvanized pipe shall be installed at elbow connections where risers are connected to buried PVC lines.

G. Unions shall be installed as needed to facilitate removal of threaded components such as valves and meters.

3.2 PIPE ALIGNMENT AND GRADE

A. Construct the water system to the lines and grades shown on the drawings or established in the field.

B. Water system shall be constructed to drain by gravity at a minimum grade of0.5% to daylight drains unless approved by the Contracting Officer.

C. Pipelines may be relocated slightly with the approval of the Contracting Officer, to avoid existing obstacles. However, lines shall be installed to slope towards drains.

D. Deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, shall not exceed the manufacturer's recommended maximum joint deflection or curvature for their pipe. If the alignment requires curvature or deflections in excess of these limitations, the Contractor shall provide special bends, standard fittings, or a sufficient number of shorter lengths of pipe to provide angular deflections at the joints within the limit set forth by the manufacturer.

E. Bends resulting in tension on joints will not be allowed.

F. All pipe, fittings, and appurtenances shall be handled and laid in strict conformance to the manufacturer's recommendations.

G. The interior of all pipe, fittings, and other accessories shall be kept as free as possible from dirt and foreign matter at all times. Each piece of line as it is laid shall be cleaned of all debris. When the pipeline has become dirty on the inside during shipment or storage, it shall be swabbed out by drawing a damp swab through the line before lying. Care shall be exercised to keep all joining surfaces clean. Any pipe with contaminated or damaged joining surfaces, which cannot be satisfactorily cleaned or repaired, shall be discarded. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or the weather is unsuitable for such work. At all times when work is not in progress, all open ends of the pipe and fittings shall be securely closed to the satisfaction of the CO so that no trench water, rodents, earth, or other substance will enter the pipe or fittings.

H. When sewer and water lines cross, the water and sewer pipes shall be centered at the crossing so that the joints will be an equal distance and as far as possible from the crossing. When sewer lines are less than 10 feet horizontally from water lines or if they are less than 18 inches lower than waterlines then encase the joints of the sewer lines in concrete.

I. Where water line crosses a road culvert, adjust grade of water line to provide a minimum of 12 inches of separation between the water line and culvert, maintaining slope of water line to daylight drain.

J. A minimum of one-foot separation shall be maintained between electric and water lines in the same trench. Unless the electric conductors are in conduit the water line shall be a minimum of one foot below the electric conductors.

K. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration.

L. Unless otherwise noted, the minimum cover over pipe shall be 30 inches.

M. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

N. Anchor service-entry piping to building wall.

O. 0. All above ground piping and appurtenances shall be galvanized steel unless otherwise noted.

P. Unless otherwise noted, each valve and meter installed below grade shall have its own individual box.

Q. Valves and meters shall not be installed below ground level in wet or saturated pits. The valve or meter shall be plumbed above grade to prevent valve or meter from being submerged in water.

3.3 VERTICAL WELL-HEAD PLUMBING

A. Unless otherwise noted, valves, meters, and appurtenances in the well-head enclosure shall be installed in this order. Beginning from the well the order of installation is first the check valve, sampling spigot, control gate valve, then a water meter before the first discharge line. Sampling spigot shall be positioned so that the outlet opening is turned down.

3.4 EXCAVATION, TRENCHING AND BEDDING

A. Excavating, trenching and bedding shall be done in accordance with Section 02318, Excavation and Backfill for Utilities.

3.5 CUTTING AND HANDLING OF PIPE

A. Cutting of pipe for closure pieces or for other reasons shall be done in a neat manner by methods, which will not damage the pipe. The pipe and fittings shall be handled in such a manner as to insure delivery and final placement in good, undamaged condition. Particular care shall be exercised not to injure the pipe surfaces or coatings. Damaged pipe shall not be used in the work.

3.6 LAYING PIPE

A. No pipe shall be placed in the trench until the CO has approved the trench and bedding.

B. Each section of the pipe shall rest upon the pipe bed for the full length of its barrel.

C. Backfill the pipe within 24 hours after installing the pipe in the trench, leaving the joints and one foot of pipe on each side of each joint exposed until testing is complete.

D. When work is not in progress, securely close open ends of pipe and fittings.

E. When high density polyethylene pipe is used, it shall be weaved in the trench to provide horizontal slack in the line for expansion and contraction.

F. High density polyethylene pipe shall be allowed to cool to within 20° F of the shaded trench bottom temperature before backfilling.

3.7 FIRE MAIN INSTALLATION

A. Comply with NFPA 24 for fire-service-main piping materials and installation.

3.8 DUCTILE IRON PIPE INSTALLATION

A. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.

3.9 COPPER PIPE INSTALLATION

A. Install copper tube and fittings according to CDA's "Copper Tube Handbook."

3.10 PVC, AWWA PIPE INSTALLATION

A. Install PVC, AWWA pipe according to AWWA M23 and ASTM F 645.

3.11 HDPE PIPE INSTALLATION

A. Install HDPE pipe according to ASTM D 2774 and ASTM F 645.

3.12 JOINT CONSTRUCTION

A. Joints shall be made using jointing materials and applied with the proper accessories, in accordance with the manufacturer's instructions. The joints shall be adjusted and the work performed in a manner so as to obtain the degree of water tightness required. If pipe and fittings are assembled with lubricant, it must be nontoxic. Where connections are made between new work and existing lines, the connections shall be made by using special fittings to suit the actual conditions.

B. Threaded Joints:

   a. Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to fitting and valve ends into which pipes are being threaded.

   b. Exposed threaded pipe joints on galvanized steel pipe shall be painted with mastic following the manufacturer's application procedures.

   c. Field cut ends shall be squared off by grinding or filing; ends shall be reamed with all chips and flakes removed.

   d. Field cut threads or machined joints shall be made with sharp tools to sharp finished ends.

C. Dissimilar Materials Piping Joints

   a. Polyethylene pipe and fittings may be joined to other materials by means of couplings designed for joining polyethylene pipe to another material.

Couplings shall be fully pressure rated and fully thrust restrained such that when installed in accordance with manufacturer's recommendations, a longitudinal load applied to the coupling will cause the pipe to yield before the coupling disjoints.

b. Use adapters compatible with both piping materials, OD, and system working pressure.

3.13 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

a. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 andAWWAM41.

b. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.

c. Copper Tubing Soldered Joints: ASTM B 828. Use flushable flux and lead-free solder.

d. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

e. HDPE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.

f. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Utility Materials" for joining piping of dissimilar metals.

3.14 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

a. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.

b. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.

c. Fire-Service-Main Piping: According to NFPA 24.

d. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.15 PIPE SLEEVE INSTALLATION

A. Where waterline crosses road paving, install waterline in pipe sleeve. Extend pipe sleeve a minimum of three feet beyond edge of pavement.

3.16 BRANCH CONNECTIONS

A. Branch connections to the main shall be made with tees.

B. Horizontal tees for waterline laterals shall not be permitted. The branch side of tees shall be up when drainage is toward the tee, and down when drainage is away from the tee.

C. Waterline tees shall be the same diameter as the largest pipe connected to the tee.

3.17 VALVE INSTALLATION

A. All valves installed in grade boxes shall have five feet of galvanized pipe on both sides leading up to the valve.

B. Gate and Globe Valves

a. Install valves on horizontal pipeline with stems vertical and pointing upward.

b. Install valves on vertical pipelines with stems pointing toward the direction of access.

3.18 AIR/VACUUM VALVE INSTALLATION

A. Install vent at high points in the water line as shown on the drawings or as designated on the ground by the Contracting Officer. I

B. Install vent in pipe in plumb position.

C. Install galvanized steel vent pipe to atmosphere in accordance with manufacturer's instructions. Vent opening shall be screened with 20mesh stainless steel screen secured with stainless steel clamp.

3.19 WATER-METER INSTALLATION

A. Install water meters, piping, and specialties according to utility company's written requirements.

B. Water Meters: Install displacement-type water meters, NPS 2 (DN 50) and smaller, in meter boxes with shutoff valves on water-meter inlets. Include valves on water-meter outlets and valve bypass around meters unless prohibited by authorities having jurisdiction.

C. Water Meters: Install compound-type water meters, NPS 3 (DN 80) and larger, in meter vaults. Include shutoff valves on water-meter inlets and outlets and valve bypass around meters. Support meters, valves, and piping on brick or concrete piers.

D. Rough-in piping and specialties for water-meter installation according to utility company's written instructions and requirements.

3.20 BACKFLOW-PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install backflow preventers with relief drain in vault or other space subject to flooding.

C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.21 UTILITY GRADE BOX INSTALLATIONS

A. Grade boxes shall be prefabricated box with adjustable extension rings.

B. Grade boxes shall be centered over fixture or group of fixtures.

C. Grade boxes shall be of adequate size to allow a minimum of 3 inches of clearance from body of installed component.

D. Drain rock shall be placed under the base of the water fixture to a depth of 8 inches below the fixture and an area that extends 12 inches beyond theperimeter of the outside dimension of the box.

E. Grade box shall be installed so the length of the box is parallel with theutility line.

F. Top of grade box cover shall be flush with the adjacent surface for trail and road locations. The top of grade box will be 4 inches above the adjacent ground, measured on the uphill side, for cross-country locations.

G. Supply one cover wrench for every four locking cover at each project site.

3.22 SERVICE ENTRANCE PIPING

A. Extend water-service piping and connect to water-supply source and building water-piping systems at outside face of building wall in locations and pipesizes indicated.

   a. Terminate water-service piping at building wall until building waterpiping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water-piping systems when those systems are installed.

3.23 DAYLIGHT DRAIN

A. Install insect screens on the atmospheric outlet of daylight drains. Attach insect screens to pipe with stainless steel hose clamps.

B. Minimum grade of slope of drain shall be 1%.

C. Place riprap securely around outlet with a minimum 6" air gap.

3.24 THRUST BLOCKS

A. All plumbing shall be in place before concrete is placed. Plumbing which will be inaccessible after concrete is placed shall be approved by the Contracting Officer before placing concrete.

3.25 BACKFILLING AND WATERLINE MARKING

A. A. Backfill and install pipe identifier in accordance with Section 02318 for utilities and this specification.

3.26 FINAL PIPE CLEANING AND FLUSHING

A. Before testing, clean new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired by high pressure water jet or mechanical means.

B. If the new waterlines are extensions or modifications of an existing water system, the new system(s) and all of the existing system immediately downstream of the control valve shall be flushed to remove sediment. The control valve referred to here is the valve in the existing system that must be closed to allow construction of new facilities.

C. During the flushing operation, operate all valves, hydrants, hose bibs and other outlets.

D. Flush system with clean potable water until dirty water does not appear at points of outlet.

3.27 PRESSURE TESTING WATERLINES

A. Testing: All water pipelines, valves, appurtenances, tanks and the like shall be tested for water tightness, to no discernable leakage for 1 hour. Water and other pressure lines, at a minimum pressure of 125 psi or the operating pressure plus 20 pounds, whichever is greater. Failures shall be repaired or replaced, and testing done until acceptance is reached.

B. Conduct piping tests before joints are covered and after thrust blocks, if required, have hardened sufficiently. Joints shall remain uncovered until testing is completed satisfactorily.

C. The Contractor shall furnish the pump, pipe, gauge, measuring device, connections, and all other necessary apparatus, and shall furnish the necessary personnel to conduct the tests. All equipment, gauges, and attachments shall be subject to approval by the CO.

D. The CO shall be present during the testing period.

E. Test all newly constructed portions of the water system, including water mains, service lines, fittings, valves, and hydrants. New waterlines that are extensions or modifications of an existing water system shall be tested at the test pressure specified here unless the CO specifies another pressure. Pneumatic testing will not be allowed.

F. Use only potable water.

G. Waterlines shall be tested in sections not to exceed 2,000 ft in length or a maximum pressure differential of 30 psi in the test section.

H. No paints, asphalts, tars, enamels, or other types of pipe compounds shall be used to eliminate leaks.

I. Backfill for waterlines shall be completed after the CO approves testing.

J. The Contractor shall furnish a written report to the CO describing the results of each test. The report must identify the specific portions of the pipeline tested, the pressure, the duration of the tests, and the amount of leakage.

3.28 DISINFECTION

A. Disinfection of segments and entire water systems shall be performed in accordance with Section 02675.

END OF SECTION

SECTION 02675 DISINFECTION OF WATER DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work consists of cleaning, flushing, and disinfecting waterlines and appurtenances in compliance with AWWA C-601-88 and as specified herein. This section also includes the disinfection of water storage tanks in accordance with AWWA C652, Disinfection of Water Storage Facilities.

1.2 RELATED SECTIONS

A. Section 02511 Water System Distribution

B. Section 02521 Well Head

C. Section 09960 High-Performance Coating

D. Section 15010 Concrete Water Tank

E. Section 15030 Bolted Steel Water Tank

1.3 CODES AND STANDARDS

A. The following codes and standards will apply to work in this Section.

a. AWWA Manual M20, "Water Chlorination, Principles, and Practices".

b. AWWA Standard C-601-68.

c. AWWA Standard C-652

1.4 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work specified in this section. Payment will be included as part of the contract price for other items of work.

PART 2 - PRODUCTS

2.1 DISINFECTING AGENT

A. Disinfecting agent shall be National Sanitation Foundation (NSF) 60 approved calcium hypochlorite, sodium hypochlorite, or elemental gaseous chlorine to produce a stock solution of known strength.

PART 3 - EXECUTION

3.1 PRELIMINARY FLUSHING

A. Flushing shall be done before installation of the water meter assembly to prevent damage to the meter. Before disinfection, the main shall be flushed thoroughly with water. Flushing shall be done after the pressure test has been made. Develop a minimum velocity in the main of at least 2.5 feet per second.

3.2 VALVE DAMAGE BY FOREIGN MATERIAL

A. If it appears that foreign material may be in the main, all valves on the line shall be thoroughly flushed, and carefully inspected after flushing, to see that the entire operating mechanism of each valve is in good condition.

3.3 DISINFECTION METHODS

A. After flushing is completed, disinfection (using liquid chlorine, sodium hypochlorite, or calcium hypochlorite) can proceed by one of the following methods or other method approved by the Contracting Officer. Distribution system disinfection shall be done prior to structures systems disinfection.

    a. Continuous Feed: In this method, water from the distribution system or other approved source and the chlorine form selected are fed at constant rate into the new main at a concentration of at least 50 milligrams per liter (mg/L). A properly adjusted hypochlorite solution injected into the main through a solution-feed chlorinator and booster pump may be used. The chlorine residual shall be checked in the presence of the Contracting Officer to insure that the proper level is

maintained. Chlorine application shall continue until the entire main is filled. The water shall remain in the tank and main for a minimum of 24 hours, during which time all valves, hydrants, and the like, along the main must be operated to insure their proper disinfection. Following the 24-hour period, no less than 25 mg/L chlorine residual shall remain in the main.

b. Slug Method: In this method, a continuous flow of water is fed with a constant dose of chlorine (as in the previous method) but with rates proportioned to give a chlorine concentration of at least 300 mg/L. The chlorine is applied continuously for a period of time to provide a column of chlorinated water that will contact all interior surfaces of the main for a period of at least three hours. As the slug passes tees, crosses, and the like, proper valves shall be operated to insure their disinfection.

3.4 DISINFECTING BROKEN WATERLINES

A. After determining location and exposure of the break, the area shall be carefully inspected to locate and isolate sewers and other contaminant sources. Following this, the Contractor shall flush the main while standing water in the trench is being pumped away. The affected section shall be isolated, service connections shall be shut off, and the section shall be subjected to disinfection procedures described for new mains. The slug may be increased to 500 mg/L. Bacteriological samples shall be taken by the Contractor / Contracting Officer following disinfection to test the effectiveness of the process.

3.5 DISINFECTING WATER STORAGE TANKS

A. Remove loose particles and remove foreign substances from tank interior.

B. Disinfect the water tank in accordance with AWWA C652, Disinfection of Water Storage Facilities.

C. Drain disinfection solution within 24 hours of completing the process and refill the tank

D. The environment to which the chlorinated water is to be discharged shall be approved by the Contracting Officer. If the chlorinated water will cause damage to the area, then a reducing agent shall be added to the water and mixed to neutralize the chlorine prior to discharge.

E. After the tank has been refilled, the water will be tested by the Contractor / Contracting Officer's Representative for bacteriological contamination. If the test is unsatisfactory, the tank shall be disinfected by the Contractor at no additional cost to the Government and retested by the Contractor until the water tests absent for Total Coliform bacteria.

3.6 FINAL FLUSHING

A. Following disinfection, all treated water shall be thoroughly flushed from the newly installed tank and pipelines.

3.7 BACTERIOLOGICAL SAMPLING

A. The Contractor shall perform water sampling for the purposes of bacteriological analysis using a state approved laboratory certified to test for the presence *I* absence of Total Coliform Bacteria and E.Coli. The resulting laboratory reports shall be provided to the Contracting Officer.

END OF SECTION

SECTION 02800 TANK CLEANING

PART 1 - GENERAL

1.1 This section describes the cleaning procedure and requirements for cleaning steel water storage tanks.

1.2 MEASUREMENT AND PAYMENT

A. The method of measurement will be designated in the Schedule of Items and measured according to Section O1026, Method of Measurement.

B. The quantities as measured above, will be paid for at the contract unit price for the item shown in the Schedule of items.

C. The completed item will be measured for payment as set forth in the Schedule of items for tank cleaning.

D. This work will be paid for on a lump sum basis when listed in the Schedule of Items.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.1 The potable tank will be in service during cleaning. All divers shall be properly trained in commercial diving and confined space entry. All divers shall meet or exceed ADC and ANSI/ACDE O1-1998 minimum training requirements. The Contractor shall submit commercial diving licenses and proof of confined space training for employees prior to tank entry.

3.2 All work shall be in compliance with 29 CFR, Part 1910, Subpart T and ANSI/AWWA Standards for potable water.

3.3 All equipment and diver (external gear) shall be disinfected with a 200+ ppm chlorine solution immediately prior to entering potable water. Divers will use full dry suits in good repair dedicated for use in potable water. Neoprene or shell dry suits are not suitable for disinfection. Divers that cannot demonstrate to the Contracting Officer that their suits are used exclusively in potable water applications will be required to use vulcanized rubber suits. The dive suit shall completely encapsulate the diver with no bare skin exposed, including hands. There shall be no contact of the mouth or head with the water during cleaning operation.

3.4 Cleaning procedures shall combine adequate brushing of surfaces cleaned in addition to removing material from the tank by vacuum or water suction in a manner that does not create turbidity inside the storage tank. The discharge water shall be directed in the general direction of overflow drainage or into the overflow catch basin if available.

3.5 Contractor shall monitor discharge rates in overflow structure. Discharge flow shall not cause soil erosion to occur at or around the outfall of the discharge pipe.

3.6 In addition to cleaning all sediment and other materials from the floor and interior walls of the reservoir, the Contractor shall ensure that all sediment is removed from all floor or floor-to-wall seams, support column bases, plumbing fixtures and supports, man entries, or any other areas where the vacuum does not reach normal floor cleaning. Brushing shall be done in conjunction with vacuuming to remove potential hazardous biofilm. A stationary or fixed brush inside a vacuum head will be considered, provided that the Contractor's methodology is thoroughly described and demonstrated to remove biofilm. Hydraulic jetting shall not be considered. Sediment removal shall be considered complete only when an unobstructed view of the tank bottom is achieved. The contractor shall provide sufficient photo or video evidence to demonstrate compliance.

3.7 Existing drain lines for tanks shall be flushed out. After flushing, the outlet of the drains shall be screened with a 12 mesh, T-304 or T-316 woven wire stainless steel cloth attached with a stainless steel clamp.

END OF SECTION

SECTION 03400 MINOR CONCRETE REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies minor repair to concrete structures.

1.2 RELATED SECTIONS

A. Section 15010 - Concrete Water Tank

1.3 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work specified in this section. Payment will be included as part of the contract price for other items of work.

PART 2 - PRODUCTS

2.1 CONCRETE REPAIR MATERIAL

A. Concrete repair material shall be Rapid Set WunderFixx, manufactured by CTS Cement Manufacturing Corporation, or approved equal.

B. Material shall be fast setting, low shrink concrete repair material that can be used from featheredge to ½ inch thick.

C. Minimum compressive strength per ASTM C109 (Mod) shall be 650psi for lday and 2000 psi in 28 days.

2.2 COLOR ADJUSTMENT ADDITIVE

A. Rapid Set Concrete Pharmacy manufactured by CTS Cement Manufacturing Corporation, or approved equal.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. All loose, unsound, and contaminated concrete shall be mechanically removed. Concrete shall be free of materials such as paint, oil, curing compound, bond breaker, set etc. that will inhibit bonding. If compressed air is used, it shall be free of oil.

B. Concrete surface shall be dry.

3.2 MIXING

A. Mix material in accordance with manufacturer's instruction. Sand, aggregate, and cement shall not be added to the mix.

B. The color additive shall be added to the mix and shall be adjusted as needed to produce a color to match the color of the concrete being repaired.

C. Mixture shall be smooth, uniform in color and texture during application.

3.3 PLACEMENT

A. Repair material shall be placed in accordance with manufacturer's instructions. Material shall be placed on a dry substrate.

B. The surface and ambient temperature shall be between 45 degree and 100 degree during the first 4 hours after placement.

C. Contractor shall protect and exercise care when applying the repair so as not to have runs or splashes on areas not being repaired.

D. Material shall be placed in one pass. Multiple passes shall be avoided.

E. Sanding shall begin when material is dry but shall be completed within 24 hours after placement.

END OF SECTION

SECTION 05500 METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Metal fabrications include items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. This section includes steel ladders, steel covers and lids, steel framing, supports, and trim.

1.2 RELATED SECTIONS

A. Section 02527 Well Enclosure

B. Section 15010 Concrete Water Tank

1.3 SUBMITTALS

A. Shop drawings showing locking mechanism details, finish, anchoring hardware and layout for steel enclosure cover shall be submitted to the Contracting Officer for approval.

1.4 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for work specified in this section. Payment will be included as part of the contract price for other work items of work.

PART 2 - PRODUCT

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals:

a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

b. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 and 316L.

c. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C orD.

d. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

e. Steel Tubing: Cold-formed steel tubing complying with ASTM A500.

f. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

g. Slotted Channel Framing: Cold-formed metal channels 1-5/8 by 1-5/8 inches (41 by 41 mm) with flange edges returned toward web and with 9/16-inch-(14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c. Channels made from galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.079-inch (2-mm) nominal thickness.

h. Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010) malleable iron or ASTM A 48, Class 30 (ASTM A 48M, Class 200) gray iron.

i. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

C. Aluminum:

a. Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T6.

b. Alloy Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.

2.2 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664 and compatible with finish paint systems indicated.

B. Shop Primer for Ferrous Metal: SSPC-Paint 20, organic zinc-rich primer compatible with topcoat.

   a. Available Products: Subject to compliance with requirements, products that maybe incorporated into the Work include, but are not limited to, the following:

      1. Carboline Company; Carboline 621.

      2. PPG Industries, Inc.; Aquapon Zinc-Rich Primer 97-670.

      3. Tnemec Company, Inc.; Tneme-Zinc 90-97.

C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls, of type, grade, and class required by application indicated.

B. Nonshrink, Nonmetallic Grout: ASTM C 1107, factory-packaged, nonstaining, noncorrosive, nongaseous grout.

C. Concrete Fill: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

D. Cast Nosings And Treads: Fabricated of cast aluminum, with an integral abrasive finish and with anchors for embedding in concrete.

a. Available Manufacturer: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Safety Tread Co., Inc.

2. Amstep Products.

3. Armstrong Products, Inc.

4. Balco/Metalines, Inc.

5. Granite State Casting Co.

6. Safe-T-Metal Co.

7. Wooster Products Inc.

E. Extruded Nosings and Treads: Extruded-aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder.

a. Available Manufacturers: Subject to compliance with requirements, manufactures offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Safety Tread Co., Inc.

2. Amstep Products.

3. Armstrong Products, Inc.

4. Balco/Metalines, Inc.

5. Granite State Casting Co.

6. Safe-T-Metal Co.

7. Wooster Products Inc.

b. Surface: Ribbed with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.

c. Provide anchors for embedding units in concrete.

d. Drill for mechanical anchors and countersink . Locate not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c.

2.4 FABRICATION

A. Connections, General: Use connections that maintain structural value of joined pieces.

a. Shear and punch metals cleanly and accurately. Remove burrs.

b. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.

c. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes.

d. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

B. Steel Ladders: Comply with OSHA and ANSI A14.3, unless otherwise indicated.

a. Elevator Pit Ladders: Comply with ASME A17.1.

b. Siderails: Continuous, l/2-by-2-1/2-inch (12-by-64-mm) steel flat bars, with eased edges, spaced 18 inches (457 mm) apart.

c. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced 12 inches (300 mm) o.c. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.

d. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3

e. Galvanize exterior ladders.

C. Loose Bearing and Leveling Plates: Fabricate loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

D. Loose Steel Lintels: Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

E. Shelf Angles: Fabricate shelf angles of sizes indicated and for attachment to framing. Fabricate with horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c.

a. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

F. Miscellaneous Framing and Supports: Fabricate steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work from structural steel of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

a. Where indicated to be cast into concrete or built into masonry, equip with integrally welded anchors at 24 inches (600 mm) o.c.

b. Fabricate steel girders for wood frame construction from continuous steel shapes. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches (600 mm) o.c.

c. Fabricate steel pipe columns for supporting wood frame construction with steel baseplates and top plates welded to pipe with fillet welds the same size as pipe wall thickness.

G. Miscellaneous Steel Trim: Fabricate units with continuously welded joints and smooth exposed edges. Miter comers and use concealed splices where possible. Fabricate cutouts, fittings, and anchorages; coordinate assembly and installation with other work.

H. Structural Steel Door Frames: Fabricate from structural shapes and bars fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops secured with countersunk machine screws. Reinforce frames and drill and tap as necessary to accept finish hardware.

a. Fabricate with steel strap anchors, with a minimum 6-inch (150-mm) embedment, welded to frame jambs no more than 12 inches (300 mm) from both bottom and head of frame, and not more than 30 inches (750 mm) apart.

b. Extend bottom of frames to floor with steel angle clips welded to frames.

c. Galvanize exterior frames.

I. Metal Floor Plate:

a. Fabricate from steel plate with abrasive material metallically bonded to steel by a proprietary process.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

i. 1KG Borden; Mebac.

ii. W. S. Molnar Company; SLIP-NOT.

J. Fabricate flush drop handles, made from same metal as plates, at each end of each removable section.

K. Pipe Bollards: Fabricate from Schedule 40 steel pipe.

a. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6-mm-) thick steel plate welded to bottom of sleeve.

2.5 FINISHES

A. Finish metal fabrications after assembly. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Shop prime ferrous-metal items not indicated to be galvanized.

a. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

b. Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Provide anchorage devices and fasteners for securing metal fabrications to in-place construction. Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.

a. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

b. Fit exposed connections accurately together. Weld connections, unless otherwise indicated. Do not weld, cut, or abrade galvanized surfaces.

B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack with nonshrink, nonmetallic grout.

C. Touch up surfaces and finishes after erection.

a. Painted Surfaces: Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.

b. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 09960 HIGH-PERFORMANCE COATINGS

PART 1 -GENERAL

1.1 REQUIREMENTS

A. The CONTRACTOR shall furnish all materials and apply high-performance coatings for water tanks.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02675 Disinfection of Water Distribution System

B. Section O1400 Quality Control and Quality Measurement

C. Section 02511 Water Distribution System

D. Section 01741 Manufacturer's Warranties

E. Section 01300 Submittals

1.3 MEASUREMENT AND PAYMENT

A. The method of measurement will be designated in the Schedule of Items and measured according to Section 01026, Method of Measurement.

B. The quantities as measured above, will be paid for at the contract unit price for the item shown in the Schedule of Items.

1.4 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ACI 201.1R - Making a Condition Survey of Concrete in Service.

B. ANSI/NSF 61 - Drinking Water Systems Components - Health Effects.

C. ASTM C 836 - High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.

D. ASTM C 957 - High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface.

E. ASTM D 36 - Softening Point of Bitumen (Ring-and-Ball Apparatus).

F. ASTM D 412 - Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

G. ASTM D 624 - Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

H. ASTM D 648 - Deflection Temperature of Plastics Under Flexural Load.

I. ASTM D 751 - Coated Fabrics.

J. ASTM D 832 - Rubber Conditioning for Low-Temperature Testing.

K. ASTM D 1117 - Testing Nonwoven Fabrics.

L. ASTM D 1682 - Breaking Load and Elongation of Textile Fabric.

M. ASTM D 2240 - Rubber Property - Durometer Hardness.

N. ASTM D 3786 - Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.

O. 0. ASTM D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser.

P. ASTM D 4258 - Surface Cleaning Concrete for Coating.

Q. ASTM D 4259 - Abrading Concrete.

R. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.

S. ASTM D 4285 - Indicating Oil or Water in Compressed Air.

T. ASTM E 96 - Water Vapor Transmission of Materials.

U. ICRI 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays.

1.5 CONTACTOR SUBMITTALS

A. Comply with requirements of Section 01300- Submittals.

B. Product Data: Submit Manufacturer's product data, including surface preparation, application, curing, and material safety data sheets.

C. Samples: Submit 3 inch x 1 inch samples for Contacting Officer's approval.

a. Cured high-performance coating, 60 mils thick.

b. Cured patching material.

c. Reinforcing fabric and joint cover sheet.

D. Potable Water Certification: Submit certification that coating has been classified by ANSI certified laboratory to ANSI/NSF 61 in tanks, pipes and joints.

E. Applicator's Project References: Submit list of completed projects including project name and location, date of project, name of coating Manufacturer, and approximate quantity of coating applied.

F. Applicator's Certificate and qualification statement addressing qualification requirements in Section 1.5, Quality Assurance, indicating individual has successfully completed the manufacturer's training program for applying product specified in this specification.

1.6 QUALITY ASSURANCE

A. Qualifications:

a. Applicator: Use Applicator experienced in the application of the specified high- performance coatings for a minimum of 2 years on projects of similar size and complexity.

b. Applicator's Supervisor: Employ a supervisor during all phases of the work that has successfully completed Manufacturer's contractor training program.

c. Applicator's Personnel: Employ persons trained for the application of high-performance coating.

B. Regulatory Requirements: Comply with environmental regulations.

C. Pre-Application Meeting:

a. Convene a pre-application meeting one week before the start of application of the high-performance coatings.

b. Require attendance of parties directly affecting work of this section, including the Contractor, Engineer, Applicator, and Manufacturer's representative.

c. Review environmental requirements, materials, protection of adjacent work, surface preparation, application, curing, field quality control, cleaning, and coordination with other work.

1.7 FIELD QUALITY CONTROL

A. Contractor shall provide inspection services by the liner's manufacturer's representative throughout all phases of surface preparation, application, and curing of coating.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

a. Deliver materials to site in Manufacturer's original, unopened containers and packaging, with labels clearly indicating Manufacturer and material.

b. Do not deliver materials to site more than two weeks before use.

B. Storage:

a. Store materials in accordance with Manufacturer's instructions.

b. Store materials indoors in an area well ventilated and protected from damage.

c. Do not store materials near open flame, sparks, or hot surfaces.

d. Store materials on raised platforms and covered by waterproof covers.

e. Keep material containers closed.

f. Keep a copy of the applicable material safety data sheets with each material.

C. Handling: Protect materials during handling and application to prevent damage.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply in wet weather or when rain is imminent.

B. Do not apply when the surface may become wet within 4 hours after application.

C. Apply when surface is a minimum of 50 degrees F (10 degrees C) and a minimum of 5 degrees F (3 degrees C) above dew point. Consult Manufacturer for cold weather application instructions.

D. Do not apply to porous substrates when substrate or ambient temperatures are rising.

E. Do not apply to porous substrates when substrate is in direct sunlight.

F. Do not apply over substrates that are frozen or contain frost.

1.10 WARRANTY

A. Provide a 5 year material warranty and 1 year labor warranty. Obtain material warranty from Manufacturer.

1.11 MEASUREMENT AND PAYMENT

A. MEASUREMENT

a. The method of measurement will be designated in the Schedule of Items and measured in accordance with Section 01026, Method of Measurement.

B. PAYMENT

a. The quantities, as measured above, will be paid for at the contact unit price as shown in the Schedule of Items.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. C.I.M. Industries Inc., 23 Elm Street, Peterborough, New Hampshire 03458, or approved alternate. Phone (603) 924-9481. Toll Free (800) 543-3458. Fax (603) 924-9482.

2.2 HIGH-PERFORMANCE COATINGS

A. General: High-performance coating is a two-component asphalt modified urethane, applied as a cold liquid which rapidly cures to form a seamless, abrasion, corrosion, and chemical resistant waterproofing coating for applications requiring classification in accordance with ANSI/NSF 61.

B. High-performance coating: CIM 1061: Two-component, high solids, elastomeric asphalt extended urethane industrial coating, or approved equal. Designed for spray, squeegee, roller, or trowel application.

a. Potable Water Service: Classified for potable water contact in tanks, pipes and joints in accordance with ANSI/NSF 61 up to 180 degrees F.

b. Elastomeric Waterproofing, ASTM C 836 and C 957: Exceeds all criteria.

c. Solids by Volume: 88 percent.

d. Volatile Organic Compounds (VOC): 0.75 pounds per gallon (90g/L).

e. Mullen Burst Strength, ASTM D 751, 50 mils: Minimum 150 persquare inch.

f. Tear Strength, ASTM D 624, Die C: 180 pounds per inch.

g. Tensile Strength, ASTM D 412, 100-mil sheet: 1000 lbs per square inch.

h. Extension to Break, ASTM D 412: 350 percent.

i. Coating Weight, 60 mils wet film thickness: 31 pounds per 100 square feet.

j. Recovery from 100 Percent Extension:

1. After 5 Minutes: 98 percent.

2. After 24 Hours: 100 percent.

k. Coating Performance, Crack Bridging:

1. 10 Cycles at -15 degrees F (-26 degrees C): Greater than 1/8 inch.

2. After Heat Aging: Greater than 1/4 inch.

l. Coating Performance, Weathering, ASTM D 822: 5000 hours - no cracking.

m. Softening Point, ASTM D 36: Greater than 325 degrees F (160 degrees C).

n. Deflection Temperature, ASTM D 648: Below -60 degrees F (-50 degrees C).

o. Service Temperature: -60 degrees F to 220 degrees F (-50 degrees C to 105 degrees C).

p. Hardness, ASTM D 2240, Shore A, 77 degrees F (25 degrees C): 65.

q. Permeability to Water Vapor, ASTM E 96, Method E, 100 degrees F (38 degrees C), 100-mil sheet: 0.03 perms.

r. Abrasion Resistance, Weight Loss, ASTM D 4060: 1.2 mg.

s. Adhesion to Concrete, Dry, Elcometer: 350 per square inch.

t. Color: Black.

C. Primer: CIM 61 BG Epoxy Primer. Two-component, high solids, epoxy primer. Follow all manufacturer's installation requirements for primer.

a. Solids by Volume: 80 percent mixed.

b. Volatile Organic Compounds (VOC): 1.41 pounds per gallon (170 g/L).

D. Bonding Agent: CIM Bonding Agent. Organo-silane compound dispersed in isopropyl alcohol. Ensures a continuous and uniform bond between surfaces. Do not use where solvent cleaners are prohibited.

a. Solids by Volume: Less than 1 percent.

b. Volatile Organic Compounds (VOC): 6.4 pounds per gallon (743 g/L).

E. Patching Material: CIM 1000 Trowel Grade. Tough, liquid applied, chemical and corrosion resistant urethane elastomer, chemically thickened to allow trowel applications with minimum sag. Use as a crack filler and for application to vertical surfaces and cold joints.

a. Elastomeric Waterproofing, ASTM C 836 and C 957: Exceeds all criteria.

b. Solids by Volume: 89 percent.

c. Volatile Organic Compounds (VOC): 0.74 pounds per gallon (88 g/1).

d. Mullen Burst Strength, ASTM D 751, 50 mils in CIM Scrim: Minimum 150 per square inch.

e. Tear Strength, ASTM D 624, Die C: 150 pounds per inch.

f. Tensile Strength, ASTM D 412, 100-mil sheet: 800 per square inch.

g. Extension to Break, ASTM D 412: 300 percent.

h. Coating Weight, 60 mils wet film thickness: 31 pounds per 100 square feet.

i. Recovery from 100 Percent Extension:

1. After 5 Minutes: 98 percent.

2. After 24 Hours: 100 percent.

j. Coating Performance, Crack Bridging:

1. 10 Cycles at -15 degrees F (-26 degrees C): Greater than 1/8 inch.'

2. After Heat Aging: Greater than 1/4 inch.

k. Coating Performance, Weathering, ASTM D 832: Pass 5000 hours -no cracking.

l. Softening Point, ASTM D 36: Greater than 325 degrees F (160 degrees C).

m. Deflection Temperature, ASTM D 648: Below -60 degrees F (-50 degrees C).

n. Service Temperature: -60 degrees F to 220 degrees F (-50 degrees C to 105 degrees C).

o. Hardness, ASTM D 2240, Shore A, 77 degrees F (25 degrees C): 60.

p. Permeability to Water Vapor, ASTM E 96, Method E, 100 degrees F (38 degrees C), 100-mil sheet: 0.03 perms.

q. Abrasion Resistance, Weight Loss, ASTM D 4060: 1.2 mg.

r. Adhesion to Concrete, Dry, Elcometer: 350 per square inch.

s. Color: Black.

F. Reinforcing Fabric and Joint Cover Sheet: CIM Scrim. Stitch bonded polyester. Compatible with coating materials.

a. Weight: 3 ounces per square yard (100 g/rn2).

b. Tensile Strength, ASTM D 1682: 57.1 pounds (30 kg).

c. Elongation, ASTM D 1682: 61.65 percent.

d. Mullen Burst Strength, ASTM D 3786: 176.8 psi (1,215 kPa).

e. Trapezoid Tear Strength, ASTM D 1117: 16.1 pounds (7.2 kg).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall inspect substrate and adjacent areas where high-performance coating will be applied. Notify the Contracting Officer of conditions that would adversely affect the application or subsequent utilization of the high-performance coating. Do not proceed with application until unsatisfactory conditions are corrected.

3.2 PROTECTION

A. Protect adjacent work and surrounding areas from contact with high-performance coating.

3.3 SURFACE PREPARATION FOR WATER TANKS

A. Prepare metal and concrete surfaces in accordance with Manufacturer's instructions and the following:

B. Provide clean, dry, and structurally sound surfaces.

C. Patch existing coating as approved by the Engineer. Roughen surface and apply sample patch to test for suitability and adhesion.

D. Condition Survey: Perform a condition survey of existing tank conditions in accordance with ACI 201.lR.

E. Abrasive Blasting:

a. Prepare surfaces to receive high-performance coating by abrasive blasting.

b. Remove dirt, rust, soil, grease, oil, paint, coatings, form release agents, curing compounds, laitance, loose material, unsound concrete, and other foreign materials that would inhibit performance of high-performance coating in accordance with ASTM D 4258 and by abrasive blasting.

c. Obtain a firm, sound surface in which bug holes are fully opened or repaired.

d. Remove sharp edges and projections.

e. Perform abrasive blasting in accordance with ASTM D 4259.

f. Receive approval by Engineer of blasting media.

g. Maintain air supply for abrasive blasting free of oil and water in accordance with ASTM D 4285.

F. Repair surface to be free of holes. Fully open bug holes before repair. Repair defects in the concrete surface, such as bug holes, air pockets, and honeycomb by filling and smoothing off with patching material, epoxy patching compound, or grout. Abrasive blast repaired surfaces.

G. Concrete surface shall have cement paste removed to expose aggregate tops and shall have a profile ofICRI CSP 4 to 6 in accordance with ICRI 03732. ICRI-CSP 4-6 surface profile exposing aggregate. The substrate must be clean and dry in accordance with Manufacturer's instructions.

H. Repair cracks in concrete surface with materials suitable for type and width of crack, compatible with substrate and high-performance coating as recommended by the high performance coating manufacturer.

I. Interior corners, construction joints at interior corners, construction joints on flat surfaces, and objects penetrating concrete surfaces shall receive special preparation treatment as required by the high performance coating manufacturer.

J. Do not apply primer or high-performance coating to surface unless two or more of the following moisture tests confirm appropriate moisture levels for properly prepared substrates:

Plastic Sheet Method (ASTM D4263)	Pass/Fail
Relative Humidity Test	< 75 % PH @ 70 F
Calcium Chloride Test	< 5 lb/1000 sqft/24 hr
Radio Frequency Test	< 5 % Moisture
As outlined in "Drying Concrete" by Lew Harriman in the March 1995 issue of *The Construction Specifier* Magazine	

3.4 APPLICATION

A. Follow all Manufacturer's Installation requirements for metal and concrete tanks. Apply manufacturer approved primer (CIM 61 BG Epoxy Primer or approved equal) to interior surface of both metal and concrete tanks. A uniform coating free of holidays or pinholes is necessary to minimize outgassing effects curing the application of the high-performance coating to porous surfaces such as concrete. Surfaces may require additional coats to obtain a pinhole free finish.

B. Allow primer to cure in accordance with Manufacturer's instructions before topcoating with the high-performance coating.

C. Apply high-performance coating in accordance with Manufacturer's instructions.

D. Keep material containers tightly closed until ready for use.

E. Keep equipment, air supplies, and application surfaces absolutely dry.

F. Mix and apply when high-performance coating is above 60 degrees F (15 degrees C).

G. Do not use adulterants, thinners, or cutback solutions.

H. Blend and mix 2-component materials in accordance with Manufacturer's instructions. Do not hand mix components.

I. Maintain air supply for material spray application free of oil and water in accordance with ASTM D 4285.

J. Apply high-performance coating directly to a clean and dry surface or to reinforcing fabric.

K. Apply 6 to 12 inch wide strip of joint cover sheet over cracks over 1/8 inch wide, non-working joints, and edges. Center joint cover sheet over all joints and adhere by first applying a tack coat of the high-performance coating.

L. Apply sufficient high-performance coating to achieve 60 mils wet film thickness for potable water immersion service.

M. Prepare for joint lines should rain or other conditions require work stoppage or extended delay. Install joint lines clean and straight. Install overlap 6 inches minimum to ensure an impervious joint. Severely abrade with wire brush or sandpaper and apply bonding agent to all areas to be recoated when more than 4 hours curing time has taken place.

N. Recoating:

    a. Recoat the high-performance coating system within 4 hours to obtain maximum interlayer adhesion to build specified thickness.

    b. Immersion Service: Complete recoating within 4 hours, except at joint lines.

c. Non-Immersion Service: Severely abrade with wire brush or surface grinder, apply bonding agent, and recoat, if high-performance coating has cured more than 4 hours.

3.5 CLEANING

A. Remove and dispose of all temporary materials used to protect adjacent work and surrounding areas.

B. Immediately remove and clean high-performance coating materials from surfaces not intended to receive the materials.

3.6 CURING

A. Cure high-performance coating in accordance with Manufacturer's instructions.

B. Do not allow uncured high-performance coating to come into contact with potable water.

C. Curing Time:

a. Allow sufficient time for solvents to evaporate from the cured high-performance coating before placing into service.

b. Allow minimum solvent release time of 2 weeks at 60 degrees F (15 degrees C) for a 60-mil coating. Other temperatures or thicknesses shall require different solvent release times.

D. Receive approval of cured coating by Contracting Officer before filling tank.

3.7 LEAK TEST

A. Following completion of curing, the tank shall be tested for liquid tightness by filling the tank to the overflow elevation. After 24 hours the tank shall be inspected visually for leaks. Detected leaks shall be repaired and the tank retested for a 24 hour period.

3.8 DISINFECTION

A. Disinfection and water sampling shall be performed in accordance with Section 02675, Disinfection of Water System.

END OF SECTION

SECTION 15010 CONCRETE WATER TANK

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies construction and refurbishing existing concrete water tanks.

B. Refurbished tanks shall include high performance liners with all new interior plumbing, float valves, and interior ladder. Installation will also include exterior ladder. Work shall include the removal and disposal of those fixtures and valves being replaced.

C. Unless otherwise noted, existing control wires and panels shall be left in place.

D. Sites requiring new concrete tanks will be specified on the Task Logs.

1.2 RELATED SECTIONS

A. Section 02511-Water Distribution

B. Section 02675-Disinfection of Water Distribution System

C. Section 05500-Metal Fabrication

D. Section 09960-High Performance Coatings

1.3 MEASUREMENT AND PAYMENT

A. Method of Measurement

a. Measurement for repairing and refurbishing tanks will be lump sum for completed water tank including all items within 5 feet of the finished exterior wall of the tank, except for the high performance coating.

b. Measurement for repairing and refurbishing existing tanks will be paid as shown in the Schedule of Items.

B. Basis of Payment

a. Payment for new water tanks will be at the contract lump sum price shown in the Schedule of Items and will include all items of work within 5 feet of the finished exterior wall of the tank, except for high performance coating.

b. Payment for high performance coating will be paid for in Section 09960, High Performance Coating.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Sealer.

a. Silicone waterproofing

1. Thoro System Product's "Thoroclear" or approved equal.

b. Joint Sealer

1. Silicon RTV Sealer: White room temperature vulcanizing silicon sealer.

B. Components

a. Float Valve

1. Cla-val 124-01, non-modulating, 1325 Newport Beach, CA 92659, or approved equal.

b. Liquid level gauge

1. Liquid level gauge shall be Tube Style Liquid Level Indicator from Tank Products, Inc. Ontario, CA 91761, or approved equal.

c. Interior Ladder

1. Interior ladder shall meet OSHA requirements and shall be manufactured with materials conforming to the requirements of NSF Standard 61 for potable water tanks. Ladder shall be installed at the location shown on the drawings or designated in the field by the Contracting Officer. Ladder shall meet the requirements of Section 05500, "Metal Fabrications."

d. Exterior Ladder

1. Exterior ladder shall meet OSHA requirements and shall be fabricated from steel, Ladder shall be hot dipped galvanized after fabrication in accordance with ASTM A-123. Ladder shall have locked access control system to prevent use of ladder other than by authorized personnel. Ladder shall meet the requirements of Section 05500, "Metal Fabrications."

e. Galvanized Pipe

1. Galvanized pipe shall be Schedule 80 and shall meet the requirements of Section 02511, Water Distribution.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. Demolition of existing structure and grading of tank site shall be completed in accordance with Section 1800, Demolition. Tank location and finished floor elevation shall be located in the field by the Contracting Officer. Final grading of site shall provide for drainage away from the water tank as approved by the Contracting Officer.

B. Site earthwork shall be done in accordance Section 02221, Structural Excavation and Backfill.

C. Pipe Under Foundation

D. Pipes under the foundation and slab shall be tested for water tightness prior to placing concrete. It shall be charged with 125psi water pressure for a minimum of one hour with no loss in pressure. The test shall be performed in the presence of the Contracting Officer.

E. Foundation

    a. Place foundation concrete after approval of excavation and form by Contracting Officer.

F. Concrete

    a. Concrete shall be constructed in accordance with Section 03300, Cast in Place Concrete

G. Metal Access Plate Hatch Covers and Tank Piping & Valve Covered Area

    a. Metal access plate hatch covers and tank piping & valve covered area shall be fabricated in accordance with Section 05500, Metal Fabrication, and shall be hot dipped galvanized after fabrication in accordance with ASTM-123. Metal access plate hatch covers and tank piping & valve covered area shall form a water and insect tight seal with tank opening. Metal access plate hatch covers and tank piping & valve covered area shall be lockable with Government furnished Forest Service padlock.

H. Roof Seal

    a. Apply 2 coats of silicone waterproofing sealer on the top of tank roof. Flow sealer over surface with a squeegee or roller type applicator.

I. Tank accessories requiring fastening to tank shall be installed in accordance with the drawings or manufacturer's instruction and the Contracting Officer's approval.

J. Pipes in water tank scheduled for replacement shall be the same size as the pipe being replaced and shall be in accordance with Section 02511, Water Distribution System. This includes pipe that will fill the tank and overflow line for the east tank.

3.2 TESTING

A. After complete erection the tank shall be filled with water for 48 hours without leaking. If a leak is discovered, it shall be repaired and retested until it passes.

B. On completion of the water tank and leak test, the tank shall be filled, then drained to a level which will show proper functioning of the float valve and liquid level gauge.

3.3 DISINFECTION

A. Disinfection and water sampling shall be performed in accordance with Section 02675, Disinfection of Water System.

END OF SECTION