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10.01 BID ALTERNATIVE – WATER MAIN RELOCATION

The bid alternative shall interrupt service for approximately two hours. Operations shall be conducted a select times as to minimize interruption of service.

The bid alternative is a revocable item. Bid items noted as "revocable items" may be deleted entirely or in part from the Work at the option of the Engineer. The provisions of Section 9-1.06B, "Increases of More Than 25 Percent", and Section 9-1.06C, "Decreases of More Than 25 Percent", of the Standard Specifications shall not apply to such omission, and no compensation will be allowed the Contractor by reason of such omission.

Specifications for abandonment, removals, furnishing, installing, disinfecting, pavement restoration, connections, and testing water system shall be as indicated in the plans and specific herein in the special provisions and these standard specifications.

Contractor shall provide submittal for the Respective manufacturer's product data for manufactured products.

- **POLYVINYL CHLORIDE PVC C-900 (RUBBER RING JOINTS).** This specification designates general requirements for unplasticized polyvinyl chloride (PVC) Plastic Pipe with integral wall bell-and-spigot joints. All PVC pipe shall be blue. PVC Pipe and Fittings shall conform to all the requirements of AWWA C-900 for pipe with a DR = 14. All pipe, fittings, and accessories shall be of the same manufacture in order that bell-and-spigot configurations will be identical. Pipe shall be made up with rubber ring joints to provide for expansion and contraction. The bell shall consist of an integral wall section stiffened with two PVC retainer rings which securely lock the solid cross section rubber ring into position. Methods of installation shall be in strict conformance with the recommendations of the manufacturer. The rubber ring gaskets shall consist of synthetic rubber compounds meeting the requirements of ASTM F-477. All fittings for C-900 pipe shall be one piece and shall meet the requirements of ASTM D-1784. Fittings shall conform to requirements of DR 14. Bells shall be gasketed joint conforming to ASTM D-3139 with gaskets conforming to ASTM F-477.
- **DUCTILE IRON PIPE (DIP).** Piping locations shall be as indicated in plans and meet AWWA C151, thickness Class 50. Fittings shall meet requirements listed in AWWA C110. Joints shall be Field Lok gaskets as manufactured by US Pipe, or equal, with copper jumper to provide electrical continuity. Mechanical, where indicated, in accordance with AWWA C111, with copper jumper to provide electrical continuity. Polyethylene encasement for protection of pipes, valves, and fittings shall be furnished and installed in accordance with AWWA C105. Provide inside pipe and fittings with 1/16 inch thick cement-mortar lining and an asphaltic seal coat in accordance with AWWA C104. All ferrous materials, restrainers, T-Head bolts, clamps, joint restraint clams, washers, tie rods, bolts and nuts shall have at least one coat of protective coating (bituminous mastic) of an approved type before backfilling. All restrainers and ductile-iron fittings and pipe shall be wrapped with at least one layer of 10-mil plastic.

- COPPER PIPE. Domestic water laterals shall be ASTM B88 type “K” copper pipe with brazed joints using minimum 15% silver brazing alloy. Fittings shall be solder-type joint, ASME B1618 or ASME B16.22.
- PLASTIC METALLIC TAPE. The Contractor shall install a continuous twelve (12) inch wide blue plastic/metallic tape 12-inches to 18-inches directly above the pipeline . Plastic tape to assist in easy location of the pipeline shall be Detectable tape as manufactured by Allen Systems, Inc, 108 East Wesley, Wheaton, IL, 60187, or Terra Tape as manufactured by Griffolyer Company, Div of Reef Industries, Inc, P O Box 33248, Houston, TX 77033, or approved equal. Legend printed on the tape shall be "CAUTION: WATER MAIN BELOW"
- LOCATOR WIRE. The locator wire shall be Copperhead No. 12 AWG-Solid HS-CCS tracer wire, 30 mil HDPE, 30 volt as manufactured by Copperhead Industries, LLC or equal. The continuity of the locator wire shall be tested prior to final paving. All wire connections shall be made with copper crimps wrapped with electrical tape.
- ADJUSTABLE REPAIR COUPLINGS. For connections of dissimilar side sewer lateral pipe materials, utilize Fernco, 5000 Series RC coupling with Type 316 Stainless Steel hardware or approved equal.
- Water: 250 lbs minimum AWWA standard, gate valve or equal with nonrising stem type with double-disc gates and mechanical-joint as appropriate for the adjoining pipe. When below grade, delete hand wheel and install operating nut and valve box. Install traffic rated concrete valve boxes (e.g.: G-5 Christy) and extensions to grade. Cover shall have type of service (water, gas, etc.) cast in. Provide one tee handle operating wrench for each size operating nut, with length to suit maximum valve depth. See Appendix, Typical Water Service and Piping Systems, for PVC details for extension stem.
- Thrust blocking and mechanic joint shall be as indicated in the plans or as approved by the Engineer. Provide Class 3000, 3/4 inch aggregate, concrete for all thrust blocks, with reinforcement where indicated or required. Mechanic joints shall be EBAA 2000SV Megalug restraint or approved equal.
- Hot mix asphalt shall be per section 10.17. Aggregate Base shall be per section 10.15.
- CONTROL DENSITY FILL (CDF). The use of CDF shall be approved by engineer prior to placement. CDF shall be flowable to fill the voids and self-leveling within the area to be backfilled. CDF shall be Shamrock Material Mix Number 1503 or approved equal.

MAINTAINING WATER SERVICES

Maintain water service and conduct operations at times selected to minimize duration and inconvenience of service interruption. Water valves in service owned by the BCPUD shall be operated only by personnel of that jurisdictional water utility district. Except as specified otherwise herein, and where applicable, materials and construction methods shall be in

accordance with the provisions of the BCPUD standard drawings and specifications.

INSTALLATION

1. Installation Requirements

- a. Excavating and backfilling, including bedding and compacting requirements, to the backflow preventer assemblies shall be in accordance with Marin County Uniform Construction Standard Detail #330 or as approved by the Engineer
- b. Provide concrete thrust blocks for elbows, tees, valves, and appurtenances of buried piping. Thrust blocks shall be constructed as indicated.
- c. Install piping true to line and grade, supported and guided to assure alignment under all conditions.
- d. Install unions at each connection to valves.
- e. Make change in line with fittings. Do not spring joints to effect change of direction.
- f. Do not field cut pipe unless necessary. Make such necessary cuts by means of equipment designed for the purpose, ensuring a smooth square end.
- g. For connection to existing pipe, provide pipe with suitable ends or adapters, after verification of size and type of existing pipe.

2. Valves

- a. Install valves in accordance with the valve manufacturer's installation instructions.
- b. Where valves are provided by the jurisdictional water utility, provide suitable access for operation of valves.
- c. If directed by Engineer, alter typical valve box to suit actual conditions. Any alterations in valve box shall be operable from the street level. All operator nuts shall be plumb to the valve box.

3. Thrust Blocks and Harnessing

- a. Provide for counteracting thrust caused by static and dynamic forces, including water hammer at bends, tees, reducers, valves, and dead-ends by installing harnessing as indicated or required. For other methods, submit details for approval of the Engineer prior to use.
- b. Provide concrete thrust blocks as indicated where harnessing is not practicable.

4. Water Service Connectors

- a. Make water service connections, as indicated, in accordance with California Plumbing Code and the installation instructions of the service pipe and fittings manufacturer. Full circle water saddles shall be stainless steel.

5. Acceptance Requirements

- a. After installation of pipes, ends of pipes shall be either capped or plugged. No piping shall be buried before being inspected and tested.

6. Corrosion Protection

All buried ferrous metal fittings and appurtenances shall be provided with bituminous coating corrosion protection and as indicated in the design plans.

- a. Ferrous metal fittings and appurtenance as herein referred to are: valves, tees, elbows, reducers, crosses, plug assemblies, services, flexible couplings, leak clamps, etc.
- b. Joints, fittings, and appurtenances that are required to be coated by the Contractor may be coated before or after installation in the trench.
- c. Bituminous coating shall be applied in two coats with a minimum 20-mil dry thickness per coat. Applications shall be in accordance with manufacturer's instructions. Allow first coat to dry as recommended by the manufacturer before application of second coat. Allow second coat to dry before encasing in polyethylene tubing or wrap. Inspector must inspect coating prior to covering with polyethylene. Joints must be not be covered with polyethylene during the pressure test witnessed by the BCPUD.

TESTS

1. Protection from Flooding

Provide positive measures to protect exposed, installed pipe and compacted pipe bedding from flooding during testing.

2. Notice of Testing

- a. Give three (3) days notice of intention of testing to the Engineer and the BCPUD. The Contractor will furnish, install, and operate pumps, gages, meters, and individual pipe connections to test openings.
- b. Designate largest sections feasible for testing and sterilizing.

3. Testing Requirements

- a. Hydrostatic Pressure Testing and Disinfection of all new water pipelines and appurtenances shall be conducted and documented in accordance with applicable AWWA Methods and Standards.
- b. Prior to backfilling, isolate system by use of approved valves, caps and plugs, or other means.
- c. Maintain such isolation throughout the performance of leakage and pressure testing.
- d. Where valves are used for isolation, eliminate leakage through such valves if it occurs. Maintain new work isolated from existing water mains, except for test connections, until testing and sterilization have been completed.
- e. For hydrostatic tests, provide approved caps and plugs in sections to be tested and remove them after testing.
- f. Prevent leakage in pipes and fittings at openings. Temporarily block plugged and capped ends to prevent displacement.
- g. Install water source connection for testing, as directed.
- h. Provide labor and materials required for leakage testing, including excavation for

- installation and removal of pumps, gages, meters, and water source connections.
- i. Where leakage exceeds the BCPUD's or AWWA Standards, perform necessary corrective measures.
 - j. Remove and replace defective pipes, joints, fittings, valves and appurtenances. Reset such items if displaced.

4. Hydrostatic Tests

- a. Perform hydrostatic tests in accordance with the BCPUD's requirements and AWWA Standards. All such tests shall be witnessed by the representative. The Contractor shall be responsible for making all such arrangements.
- b. Test the potable water system hydrostatically in sections to a pressure of at least 150 psi for not less than 15 minutes. Pressure test pipe before backfilling. Repair leaks and retest the system until the system is leak free. Use instruments calibrated by a quality laboratory. Test sequence shall be as follows:
 - i. Lines shall be fully flushed.
 - ii. Lines shall be hydrostatically tested.
 - iii. Lines shall be fully flushed.
 - iv. Lines shall be fully disinfected.

SYSTEM DISINFECTION

1. Standard Disinfection Procedure For Domestic Water System

- a. Supervision and Testing: Perform entire disinfection procedure under the supervision of the BCPUD staff, and in accordance with AWWA Standards. Provide five (5) days' notice to schedule procedure.
- b. Disinfecting Agent: An aqueous solution of sodium hypochlorite (minimum 5.25% available chlorine). The use of powdered hypochlorite and chlorine gas are prohibited unless specifically approved by Environment, Health and Safety (EH&S).
- c. Preliminary Preparations:
 - i. Service Cock: Provide within three feet (3'-0") of the entrance of the supply main to the building, a three-quarter inch (3/4") service cock, or valve, for the purpose of introducing the disinfecting agent.
 - ii. Flushing: After final pressure tests and before draining for disinfection, open each fixture or outlet until the water flow is clear.
- d. Disinfection Procedure:
 - i. Drain entire domestic water system including fire line.
 - ii. Post suitable warning signs at each outlet: Warning - Do Not Use - Water System Being Chlorinated.
 - iii. Inject disinfectant solution into the system through the service cock by means of a pump, or other pressure device, at a slow continuous rate, simultaneous with a reduced flow from the water main, until the Ortho-Tolidin test for residual chlorine at each outlet shows a concentration of at least 50 ppm, but note more

- than 100 ppm.
- iv. Close all outlets and valves, including the service valve at the main and the injection cock. Retain the chlorinated water in the system for 24 hours.
 - v. After the 24 hour holding period, the residual chlorine concentration shall be not less than 50 ppm as shown by the Ortho-Tolidin test.
 - vi. Drain and flush entire domestic water system until Ortho-Tolidin tests show background residual chlorine concentration at any and all outlets.
 - vii. Environment, Health and Safety (EH&S) shall determine whether samples of water must be collected and analyzed for the determination of bacteriological quality.
- e. Standards Necessary for Approval:
- i. The water system shall have been uniformly chlorinated under the supervision of the BCPUD as outlined above.
 - ii. The results of water sample analysis shall be negative for the Coliform organisms.
 - iii. If the test for the bacteriological quality of the water in the system does not meet the standards, repeat the disinfection procedure until the specified standards are met.
 - iv. Final Approval: The BCPUD shall give written approval to the County for acceptance and use of the water system after the above procedures have been successfully completed and the standards met.

CONNECTIONS TO EXISTING MAINS

1. Following testing and sterilization, new water distribution lines shall be connected to the existing main as indicated. The connection shall be made at a time and in a manner which will result in the least interruption of service.
2. All connections involving shut down of the BCPUD's existing facilities shall be made under the immediate supervision of the BCPUD. No member of the Contractor's forces may operate any valve controlling the flow of water in the water utility's existing system.
3. The Contractor shall make tie-ins to the existing system at a time which is convenient to the BCPUD, which may be in the evenings and on weekends.
4. All piping to be abandoned, as shown on the plans, is abandoned only when the pipe has been taken out of service, physically disconnected from the active water system, and has been sealed by the Contractor.
5. The Contractor shall seal all cut ends of the existing piping that are not connected to the new system by either installing temporary fittings on the existing pipe or by plugging the cut end with concrete extending two pipe diameters into the pipe.

PAYMENT - The contract price paid per linear foot for "8-inch Water Main - Revocable" shall include full compensation for furnishing all labor, materials, tools, equipment testing and incidentals, and for doing all the work involved in saw-cutting, pavement removal and disposal, trench excavation, 2" milling and filling of asphalt pavement, dewatering, removal of existing pipe and materials, abandoning of existing water main, construction of new water

main pipe, thrust blocking, mechanical joints, couplers, water valve, furnishing and placing trench backfill materials, potholing existing utilities, disinfection, testing, coordination with jurisdictional water district, connections, complete in place, as shown on the plans and as herein specified; and no additional compensation will be allowed therefor.