SECTION 02400 - STORM DRAIN SYSTEM

CONTENTS:

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PART 1 - GENERAL

1.01 WORK INCLUDED

Work on this project includes, but is not limited to, the following:

A. Constructing storm drain manholes and catch basins with frames and covers, as indicated on the plans and specified herein.

B. Modifying existing storm drain manholes as shown on the plans and specified herein.

C. Installing new storm drain structures and junction boxes as shown on the plans and specified herein.

D. Furnishing, installing, and connecting storm drain pipes and appurtenances as shown on the plans and specified herein.

1.02 RELATED REQUIREMENTS

A. Section 02221, *"Trench Excavation and Backfill"*

B. Section 02500, *"Paving and Surfacing"*

C. Section 03300, *"Minor Concrete"*

1.03 REFERENCE STANDARDS

A. State Specifications

B. American Society for Testing and Materials (ASTM)

1.04 QUALITY ASSURANCE

The Contractor's attention is directed to Article 8 of the City's General Conditions (Section 00700). To validate that specified final elevations have been provided, the Contractor shall provide to the City applicable grade certificates as required by Article 8. No separate payment will be made for providing such certification; all cost therefore shall be included in the payment for various work item(s) requiring certification.

1.05 MEASUREMENT AND PAYMENT

Separate payment shall not be made for single items unless specifically noted.

A. Catch Basins

1. Catch basins shall be measured and paid for at the unit price bid, which price shall include full compensation for excavation, backfill, rebar, concrete, frames and grates, pavement replacement, and all incidental work and services involved in the construction of the completed structure.

B. Manholes

1. Manholes including frames and covers shall be measured and paid for at the unit price bid, which price shall include full compensation for excavation, backfill, rebar, concrete, castings, pavement replacement, and all incidental work and services involved in the construction of the completed structure.

C. Manhole Modification

1. Manhole modification shall be measured and paid for at the unit price bid, which price shall include full compensation for excavation, backfill, rebar, concrete, pavement replacement, and all incidental work and services involved in the construction of the completed structure.

D. Storm Drain Structures and Junction Boxes

1. Storm drain structures and junction boxes shall be paid for at the unit price bid, which price shall include full compensation for excavation, backfill, castings, forms, concrete, rebar, pavement replacement, and all incidental work and services involved in the construction of the completed structure.

E. Pipes

1. Pipes shall be measured and paid for per Linear Foot for the different sizes and classes of pipes, as listed on the Bid Schedule.

2. Payment shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in installing different sizes, classes, and types of pipe, complete in place, including trenching, excavation and backfill, and connecting new pipe to existing or new facilities, concrete collars, or concrete tees and reinforcements, as shown on the plans and as specified in these specifications and Special Provisions, and as directed by the Engineer.

PART 2 - PRODUCTS

2.01 CONCRETE

A. Concrete shall conform to Section 03300, *"Minor Concrete,"* of these specifications.

2.02 MORTAR

A. One part Portland Cement and two parts sand by volume, conforming to Section 65-1.06A, *"Cement Mortar,"* of the *State Specifications*.

2.03 PRECAST CONCRETE MANHOLES

A. Precast storm drain manholes shall conform to Section 70-1.02H, *"Precast Concrete Structures,"* of the *State Specifications*. Storm drain precast manhole sections shall be jointed by sealing compounds like "RAM-NEK" or "ADEKA ULTRA SEAL".

2.04 REINFORCING BAR

A. Reinforcing bars shall conform to Section 03300, *"Minor Concrete,"* of these specifications.

2.05 CATCH BASIN FRAMES AND GRATES

A. Frames and grates for catch basins shall be fabricated from structural steel conforming to ASTM A36, galvanized, and in accordance with Section 75, *"Miscellaneous Metals,"* of the *State Specifications* and *applicable City Standard Drawings*.

2.06 PRECAST CATCH BASINS AND DROP INLETS

A. For alternate construction, Contractor may use precast drainage box like "CHRISTY" U43, or "SANTA ROSA" Type G0, or approved equal.

2.07 REINFORCED CONCRETE PIPE

A. Reinforced Concrete Pipe (RCP) shall be manufactured in conformance with ASTM C76 and other applicable provisions of ASTM C361, with rubber-gasketed compression joints. The joints shall be all concrete bell and spigot type using a round O-ring rubber gasket seal. Upon closure of the joint, the gasket shall be self-contained and compressed in a groove on the spigot end of the pipe. Mortared joints will not be acceptable. At all times, plant facilities will be made available for

the Engineer's inspection. In any case, all required testing and certifications of testing compliance in conformance with referenced ASTM Specifications shall be furnished to the Engineer prior to the time of pipe delivery. Pipe may be made by centrifically spun, packerhead or vertically cast production methods. Machine tamped production methods will not be acceptable. If elliptically reinforced pipe is furnished, it shall be clearly marked for proper installation. Unless otherwise specified in the Special Provisions or shown on the Plans, provide pipe Class III.

2.08 CORRUGATED METAL PIPE

A. Shall be corrugated aluminum pipe, conforming to applicable provisions of Section 66-2, *"Corrugated Aluminum Pipe,"* of the *State Specifications*.

2.09 MANHOLE FRAMES AND COVERS

A. Manhole frames and covers shall be Phoenix Model P-1090, as manufactured by Phoenix Iron Works, Second and Castro Streets, Oakland, California 94604, or approved equal, and stamped "STORM DRAIN."

2.10 PLASTIC PIPE

A. Plastic pipe shall not be used within the City's or public right of way, except as approved by the Engineer.

B. Plastic pipe shall be polyvinyl chloride (PVC) of the types and classifications shown on the plans and shall conform to applicable requirements of ASTM D 2241, *"Bell-End Poly (Vinyl Chloride) (PVC) Pipe"*, ASTM D 2672, *"Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)"*, and ASTM D 3139, *"Joints For Plastic Pressure Pipes Using Flexible Elastomeric Seals."*

2.11 BACKFILL MATERIALS

A. Shall be as specified under Section 02221 of these Specifications, the Special Provisions and applicable City Standard Drawings.

B. Initial backfill material for ground areas saturated by water shall be granular material, clean and free of clay, silt or organic matter, and shall be Class 1, Type B, conforming to the requirements of Section 68-1.025, "Permeable Material," of the State Specifications.

PART 3 - EXECUTION

3.01 CATCH BASINS AND DROP INLETS

A. Catch basins and drop inlets shall be constructed at the location and of the type indicated on the plans and shall be verified on the site by the Contractor.

B. They shall be concrete structures and shall be fitted with frames and grates, as shown on applicable City Standard Drawings for the specified type of structure.

C. Upon completion, in accordance with City Standards, curbs adjacent to the catch basin shall be labeled with "No Dumping; Flows to Ocean/Bay"

3.02 CONCRETE STRUCTURES

A. The concrete structures shall be either cast in place or precast units and shall be installed in conformance with Section 03300, *"Minor Concrete,"* of these specifications. Concrete structures shall not be plastered.

3.03 STORM DRAIN MANHOLES

A. Manholes shall be constructed at the location and of the type indicated on the plans.

B. They shall be precast concrete units conforming to Section 70-1.02H, "*Precast Concrete Structures*", of the *State Specifications*, and constructed in accordance with *applicable City Standard Drawings*.

3.04 PIPE CONNECTION

A. Pipe connection to existing manhole shall be made in such a manner that the finish work conforms to the applicable requirements specified for new manholes, including all necessary concrete work, cutting and shaping.

3.05 REINFORCED CONCRETE PIPE

A. The reinforced concrete pipe shall be laid in accordance with Section 65-1.07, *"Laying Pipe,"* of the *State Specifications.*

3.06 CORRUGATED METAL PIPE

A. Corrugated metal pipe shall be laid in accordance with Section 66-1.05, "*Laying Pipe,*" of the *State Specifications.*

3.07 EXCAVATION AND BACKFILL

A. Excavation and backfill shall be as specified in Section 02221 of these Specifications and applicable City Standard Drawings.

B. All pipe materials and accessories shall be on site prior to excavation. Unless otherwise specifically approved by Engineering/DWWR, the length of open trench shall not exceed 100 ft. ahead of pipelaying and no more than 25 ft. of excavated trench shall remain unbackfilled at end of day.

Excavations in public streets shall be coordinated so as to minimize traffic interference. Trenching in paved areas shall be saw cut or scored and broken ahead of trenching operations and shall be cut or trimmed to a neat edge after backfilling. Any pavement damaged outside of the cuts shall be saw cut and restored prior to final paving.

C. Roots four inches (4") or greater found during excavation shall be exposed but not severed and shall be wrapped in burlap to protect them while exposed. Roots two to four inches (2"-4") in diameter that are severed in the course of construction shall be neatly trimmed and coated with a heavy coat of tree seal. In the event major roots of smaller trees are damaged or severed the engineer may require the contractor to consult with a qualified arborist to determine the proper method to protect the trees.

Trenches must be kept free from water while the pipe or structures are being installed, concrete is setting and until backfill has progressed to a sufficient height to anchor the work against possible flotation or leakage.

3.08 SUBSURFACE DRAINS

A. Subsurface drains shall be tied to drain inlets or manholes as shown on the Plans.

3.09 PLASTIC PIPE

A. Except in street and driveway areas, plastic pipe shall be in accordance with applicable requirements of ASTM D 2241, ASTM D 2672, and ASTM D 3139.

3.10 TESTING

A. The Contractor shall perform a video inspection of the piping system and shall furnish the City with a copy of the video.

B. The Contractor shall have all storm drain lines cleared by either mechanical or hydraulic balling before a video inspection is performed. A screen trap shall be installed at the downstream manhole of the line to be cleared to prevent debris from entering existing mains.

C. The Contractor shall pay for all associated testing costs except for City-funded projects.

D. All defects and leaks noted shall be corrected by the Contractor to the satisfaction of the Engineer.

3.11 SETTING MANHOLE FRAMES AND COVERS TO GRADE

A. All manhole castings shall be raised to new grade by bricks, and mortar and/or Pre-Cast Grade Rings in compliance with these specifications, as outlined for a new casting, after street paving has been replaced.

3.12 ABANDONMENT OF STORM DRAIN PIPES AND MANHOLES

A. Twelve-inch (12") and larger storm drain pipes to be abandoned shall be plugged and filled with slurry mixture containing a minimum of two (2) sacks of Type II cement per cubic yard of mixture.

B. Filling with slurry shall be accomplished by pumping or gravity, and will be checked by comparing the volume of the pipe with the volume of mixture used. If the volume is more than 10 percent (10%) greater than the actual volume of slurry used, the Contractor shall excavate two (2) or more exploratory holes where directed by the Engineer, and shall do all work necessary to satisfactorily fill any encountered voids.

C. Ten-inch (10") and smaller pipes to be abandoned shall be plugged at both ends with mortar not less than six inches (6") or by a tight brick wall with cement mortar joints not less than eight inches (8") thick.

D. Manholes to be abandoned shall have their cones removed, backfilled with slurry, or native material compacted to ninety-five (95%) relative compaction. Frames and covers not to be reused shall be delivered to the City as directed by the Engineer.

End of Section