SECTION 02630

STORM DRAINAGE SYSTEM

1. PART 1 GENERAL

1.1 RELATED WORK

A. Section 02321: Trenching, Backfilling & Compacting
B. Section 02950: Site Restoration and Rehabilitation
C. Special Conditions for Water Discharge Management and Environmental Pollution Prevention

1.2 REFERENCES

A. American Association of State Highways and Transportation Officials (AASHTO): M36 Corrugated Metal Drainage Pipe.
B. American Society for Testing and Materials (ASTM):
   1. A74 Cast Iron Soil Pipe and Fittings.
   2. A615 Deformed and Plain Billet-Steel Bars for Reinforcement.
   6. C478 Precast Reinforced Concrete Manhole Sections.
   8. D3034 Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.
   10. F2648 High Density Polyethylene Pipe (HDPE)
   11. DMS 6200 Filter Fabric
C. California Department of Transportation (Caltrans) Standard Specifications:
   1. Section 51 Concrete Structures
   2. Section 52 Reinforcement
3. Section 55 Steel Structures
4. Section 61 Culvert and Drainage Pipe Joints
5. Section 62 Alternative Culverts
6. Section 63 Cast in Place Concrete Pipe
7. Section 64 Plastic Pipe
8. Section 65 Reinforced Concrete Pipe
9. Section 66 Corrugated Metal Pipe
10. Section 68 Subsurface Drains
11. Section 70 Miscellaneous Facilities
12. Section 72 Slope Protection
13. Section 75 Miscellaneous Metal
14. Section 90 Portland Cement Concrete

D. California Code of Regulations Title 8, Industrial Relations and CAL/OSHA Construction Safety Orders

1.3 SUBMITTALS

Provide manufacturers specification and literature for all material furnished.

1.4 DELIVERY AND HANDLING

A. General: Reinforced concrete pipe, precast concrete manhole sections, inlet frames and grating, and fittings must be handled carefully at all times. Only suitable and proper equipment and appliances shall be used for the safe loading, hauling, unloading, handling, and placing of materials. Material that is checked, spalled, or damaged shall not be installed and must be permanently removed from the job site.

2. PART 2 PRODUCTS

2.1 POLYVINYL CHLORIDE (PVC) PIPE

A. Polyvinyl chloride pipe and fittings shall conform to ASTM D3034, SDR 35 with bell and spigot type rubber-gasketed joints.

2.2 HIGH DENSITY POLYETHYLENE PIPE (HDPE)
A. High Density Polyethylene pipe and fittings shall conform to ASTM F2648, ASTM 3212 and ASTM C969 with watertight bell and gasketed joints. One foot minimum cover shall be provided over the pipe crown for 4 inch through 48 inch diameter pipes installed in traffic areas (AASHTO H-25 or HS-25 loads). Backfill envelope shall conform to the requirements of ASTM D2321.

2.3 CORRUGATED METAL PIPE (CMP)

A. Corrugated metal pipe shall be galvanized and have a bituminous paved invert. CMP shall conform to Section 66-3 of the CDT Standard Specifications and to AASHTO Designation M36. Thickness shall be 0.109 inches (12-gage) with 2-2/3" x 1/2" corrugations.

2.4 REINFORCED CONCRETE PIPE (RCP)

A. Reinforced concrete pipe shall conform to ASTM C76 with tongue and groove or bell and spigot joints. Unless indicated otherwise on the Plans, all reinforced concrete pipe shall be Class III, 1350-D pipe.

2.5 CAST IRON PIPE (CIP)

A. Cast iron pipe and fittings shall conform to ASTM C74. Joints shall be rubber-gasketed bell and spigot type.

2.6 PERFORATED UNDERDRAIN

A. Perforated underdrain shall be polyvinyl Chloride (PVC) pipe up to and including 15 inches in diameter, conforming to ASTM D3034, SDR 26.

2.7 CATCH BASINS AND MANHOLES

A. Precast drainage structures shall conform to Sections 70-1.02H and 71-1.03 of the CDT Standard Specifications and ASTM C478 and shall be of the size and shape shown on the drawings. Equivalent poured-in-place structures may be used at Contractor's option.

B. Frames and covers shall be cast iron conforming to Section 55-2.03 and 75-1.02 of the CDT Standard Specifications. Manhole covers shall have 24" clear opening with the words "STORM DRAIN" in letters not less than 2" high cast into the cover (except where grated covers are shown on the drawings). Manhole frames and covers shall be Stanford University “Rosette” pattern as supplied by D&L Supply, manufactured in the United States. Foreign made frames and covers will not be accepted.

C. Grates for catch basins shall have reticuline bars as shown on the plans suitable for use in areas with bicycle traffic. Area drains in non-paved areas shall have a “beehive” type grate by East Jordan Iron Works, part No. 3715 or equivalent.

D. Frames and grates for manholes and catch basins shall be match-marked in pairs before delivery to the job site. The grates shall fit into their frames without rocking.
2.8 PORTLAND CEMENT CONCRETE

A. Concrete shall be Class A concrete conforming to Section 90 of the CDT Standard Specifications.

B. Cement shall be Type II cement conforming to ASTM Designation C150 as modified by Section 90 of the CDT Standard Specifications.

C. Aggregate shall be 3/4" maximum size conforming to Section 90 of the CDT Standard Specifications.

D. Water shall be clear and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

E. Reinforcing bars shall conform to the requirements of ASTM A615 Grade 40 and deformed in accordance with Section 52 of the CDT Standard Specifications.

F. No admixtures will be allowed without prior approval of the Water Shop.

2.9 SLOTTED EDGE DRAIN

A. The slotted edge drain pipe sections and hugger bands will be purchased from Contech by the Contractor. The slotted edge channel is to be primed and painted black prior to installation.

B. An alternative joint sealant or sealing method that will provide a watertight joint may be used provided said alternative sealant or method is approved, in writing, by the Utilities Department.

2.10 FILTER FABRIC

A. Filter fabric may be one of the following:

1. Mirafi 140N

2. Typar four (4) oz.

3. True Tex MG-100

4. Bidim C-22

2.11 ROCK SLOPE PROTECTION
Rock slope protection shall conform to the requirements of CDT Section 72. Facing rock, method B placement shall be used in the Stanford Ave., Serra St. and Galvez St. ditches.

3. PART 3

EXECUTION

3.1 PIPE INSTALLATION:

Pipe shall be installed in conformance with Section 02321 – Trenching, Backfilling and Compacting.

A. No pipe shall be laid until the Water Shop's representative inspects and approves the condition of the bottom of the trench. Pipe laying shall proceed upgrade with the spigot section of bell and spigot pipe pointing in the direction of flow.

B. All above-grade piping shall be securely attached to building wall or anchored to ground as required to maintain the grades shown on the drawings.

3.2 SLOTTED EDGE DRAIN

A. Trench: Trench excavation for the slotted edge drain will be completed during the roadway excavation phase at the cost of the Contractor.

B. Pipe: Slotted edge drain and hugger bands shall be stored, handled and laid in such a manner as to prevent bruising, scaling or breaking of the surface or protective coating.

1. The Contractor shall develop and propose a method for positioning the slotted edge drain to the specified line and grade shown on the plans prior to placing the concrete encasement. The top of the slotted edge drain shall not deviate from the specified horizontal position more than 1/2 inch per 20 foot section of pipe. The vertical position of the pipe shall conform to the slopes shown on the plans.

2. The pipe slot shall be covered with a heavy duty tape or other covering, approved by the Project Administrator, prior to placing the concrete encasement and any paving operations to prevent infiltration of material into the pipe.

C. Concrete Encasement: Concrete Encasement for the slotted edge drain shall be placed in accordance with the details shown on the plans and shall conform to the requirements for Class C concrete in Section 90, "Portland Cement Concrete", of the CDT Standard Specifications. Concrete Encasement shall be placed against the bottom and undisturbed sides of the trench or forms, and consolidated in a manner that will prevent floating or shifting of the pipe, and voids in, or segregation of, the concrete. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backing to contain the concrete within the trench. Foreign material which falls into the trench, prior to or during placing of the concrete, shall be immediately removed.

D. Loads shall not be placed on the Concrete Encasement sooner than 8 hours after placement.
3.3 POURED-IN-PLACE CONCRETE

A. All concrete shall be mixed in accordance with applicable provisions of Section 90 of the CDT Standard Specifications.

B. Construction of concrete structures shall conform to applicable provisions of Section 51 of the CDT Standard Specifications. Unless otherwise noted herein, all exposed surfaces of structure shall have a Class 1 surface finish.

C. Curing shall conform to applicable portions in Section 90 of the CDT Standard Specifications. No pigment shall be used in curing compounds. All work shall be subject to inspection. No concrete shall be placed until the Construction Administrator has approved the forms and reinforcement.

D. Concrete shall not be dropped freely where reinforcing bars will cause segregation, nor shall it be dropped freely more than six feet (6’0”). Spouts, elephant trunks, or other approved means shall be used to prevent segregation.

3.4 TRENCH DRAIN

A. The trench drain shall be excavated and lined with filter fabric with a twelve inch (12”) overlap on the top of the trench. The perforated pipe shall be installed with perforations down and backfilled with class I permeable material per Section 68-1.025 of the Caltrans Standard Specifications.

3.5 FIELD QUALITY CONTROL

A. Prior to the encasement of the slotted edge drain pipe, the Contractor shall have the Field Surveyor verify the accuracy of the alignment and grade of the pipe. All adjustments to the alignment and grade shall be the Contractor's responsibility before the pipe is encased.

3.6 GRADE ADJUSTMENTS TO SURFACE STRUCTURES

A. Frames, Grates and Covers

1. Frames, grates and covers of all surface structures (manholes, drain inlets, catch basins, etc.) shall be adjusted to within 1/8” +/- of proposed finish grade. Grade rings shall be supplied and installed as required.

2. Frames of new or adjusted surface structures shall be supported by concrete with minimum dimensions as follows: 12 inches wide by 10 inches deep in paved areas, and 6 inches wide by 10 inches deep in non-paved areas.

B. Structures Within Paved Areas
1. A structure located in an area to be resurfaced with asphaltic concrete shall not be constructed to final grade until the adjacent pavement or surfacing has been completed.

2. The Contractor shall be responsible for referencing structures prior to paving and locating them after paving operations are complete.

3. After asphaltic concrete resurfacing is complete, the asphalt shall be cut out six inches (6") wider than the frames of all surface structures. Each frame shall then be raised to finished grade (sloped as necessary) and concrete shall be placed to approximately 1-1/2 inches below finish grade as noted above. After the concrete collar has cured, a tack coat shall be applied and asphaltic concrete placed to finish grade.

END OF SECTION