



**Fresno Metropolitan
Flood Control District**

**STANDARD
PLANS AND SPECIFICATIONS**

April 1, 2011

**Fresno Metropolitan Flood Control District
Standard Specifications
April 1, 2011
Table of Contents**

GENERAL PROVISIONS

SECTION 1 – DEFINITIONS AND TERMS		PAGE
1-1	General.....	1-1
1-2	Interpretation.....	1-1
1-3	Abbreviations.....	1-1
1-4 through 1-44	Definitions	1-2 through 1-6
 SECTION 2 – PROPOSAL REQUIREMENTS AND CONDITIONS		
2-1	General.....	2-1
2-2	Contents of Proposal Forms.....	2-1
2-3	Engineer's Estimate of Quantities.....	2-1
2-4	Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site of Work.....	2-1
2-5	Pre-Bid Tests.....	2-2
2-6	Submitting Proposal Form	2-2
2-7	Proposal Guaranty.....	2-3
2-8	Required Listing of Proposed Subcontractors	2-3
2-9	Withdrawal of Proposals.....	2-4
2-10	Opening of Proposals.....	2-4
2-11	Disqualification of Bidders.....	2-4
2-12	Rejection of Proposals	2-4
2-13	Relief of Bidders.....	2-4
 SECTION 3 – AWARD AND EXECUTION OF CONTRACT		
3-1	Award of Contract.....	3-1
3-2	Award of Contracts with Multiple Construction Units.....	3-1
3-3	Submission of Proof of Insurance.....	3-1
3-4	Execution of Contract	3-2
3-5	Contractor's Bonds	3-2
3-6	Failure to Execute Contract	3-2
3-7	Return of the Proposal Guaranty.....	3-2
3-8	Materials Statement, Samples.....	3-2
 SECTION 4 – SCOPE OF WORK		
4-1	Intent of Plans and Specifications.....	4-1
4-2	Work to be Done.....	4-1

SECTION 4 (Cont'd)	PAGE
4-3 Changes.....	4-1
4-4 Extra Work.....	4-1

SECTION 5 – CONTROL OF WORK

5-1 Authority of the Engineer	5-1
5-2 Performance to be in Accord with the True Intent	5-1
5-3 Plans and Working Drawings	5-1
5-4 Interpretation of Plans, Standard Specifications, and Special Provisions; Precedence ...	5-2
5-5 Pre-Construction Conference, Notice to Proceed.....	5-3
5-6 Order of Work; Schedule of Operations	5-3
5-7 Authorized Representative.....	5-3
5-8 Emergency Availability	5-3
5-9 Surveying/Staking; Lines and Grades.....	5-3
5-10 Establishment and Maintenance of Marks and Stakes.....	5-4
5-11 Inspection During Construction.....	5-4
5-12 Alternative Methods of Construction.....	5-5
5-13 Removal of Defective, Rejected, or Unauthorized Work.....	5-5
5-14 Subcontractor’s Operations.....	5-6
5-15 Incompetent or Disorderly Workers	5-6
5-16 Final Inspection.....	5-6

SECTION 6 – CONTROL OF MATERIALS

6-1 Testing of Materials and Work	6-1
6-2 Supply and Quality of Materials	6-1
6-3 Samples and Tests.....	6-1
6-4 Storage of Materials	6-2
6-5 Certificates of Compliance	6-2
6-6 Brand or Trade Name Materials	6-3
6-7 Foreign Materials	6-3
6-8 Defective Material	6-4
6-9 Guarantee of Materials and Workmanship	6-5
6-10 Salvage of Materials	6-5

SECTION 7 – LEGAL RELATIONS AND RESPONSIBILITIES

7-1 Compliance with Laws and Regulations.....	7-1
7-2 Modification, Amendment, or Termination of Contract.....	7-1
7-3 Security of Employee Compensation.....	7-1
7-4 Hours of Labor.....	7-1
7-5 Labor Nondiscrimination	7-2
7-6 Travel and Subsistence	7-2
7-7 Prevailing Wage; Payroll	7-2
7-8 Employment of Apprentices	7-3
7-9 Contractor’s Licensing Laws	7-3

SECTION 7 (Cont'd)	PAGE
7-10 Permits, Licenses, and Fees	7-3
7-11 District Responsibility for Damage	7-4
7-12 Defense and Indemnification	7-4
7-13 Insurance	7-5
7-13.01 Workers' Compensation and Employer's Liability Insurance	7-5
7-13.02 Commercial General Liability and Automobile Liability Insurance	7-6
7-14 Contractor's Responsibility for Work and Materials	7-9
7-15 Responsibility of District	7-9
7-16 Sanitation Regulations	7-10
7-17 General Worker Safety	7-10
7-18 Worker Protection From Caving Ground in Excavations	7-11
7-18.01 General	7-11
7-18.02 Excavations Greater Than 20 Feet	7-11
7-18.03 Protection for Others	7-11
7-18.04 Soils Investigations	7-12
7-18.05 Payment	7-12
7-19 Worker Protection From Toxic Or Explosive Gases; Confined Spaces Entry	7-12
7-20 Trenches And Excavations - Hazardous Waste	7-13
7-21 Protection of Archeological, Cultural, Paleontological Resources	7-13
7-22 Protection of Underground Utilities	7-14
7-23 Protection and Restoration of Existing Improvements	7-14
7-24 Public Convenience and Safety	7-15
7-25 Traffic Control	7-16
7-26 Dust Control	7-17
7-27 Air Pollution, Contractor's Equipment	7-18
7-28 Maintaining Drainage	7-19
7-29 Water Pollution Prevention	7-19
7-29.01 National Pollutant Discharge Elimination System (NPDES) Compliance	7-20
7-29.01.1 Preparation of Permit Registration Documents; Map; Payment of Fees..	7-21
7-29.01.2 Preparation of Storm Water Pollution Prevention Plan (SWPPP), Site Map, and Construction Site Monitoring Plan (CSMP)	7-21
7-29.01.3 SWPPP and CSMP Implementation	7-21
7-29.01.4 Preparation and Submittal of Notice of Termination	7-23
7-29.01.5 Measurement and Payment	7-23
7-30 Use of Pesticides	7-23
7-31 Disposal of Material	7-24
7-32 Electrical and Water Service	7-24
7-33 Sound Control Requirements	7-25
7-34 Right-of-Ways, Easements, Work Areas	7-25

SECTION 8 – PROSECUTION AND PROGRESS OF THE WORK

8-1 Commencement of the Work	8-1
8-2 Notice to Residents	8-1
8-3 Subcontracting	8-1

SECTION 8 (Cont'd)		PAGE
8-4	Assignment	8-2
8-5	Progress of the Work	8-2
	8-5.01 Surfacing Removal	8-2
	8-5.02 Open Trench/Structure Excavation Time Limits.....	8-3
	8-5.03 Trench/Structure Backfill Time Limits	8-3
	8-5.04 Compaction, Surface Restoration	8-3
	8-5.05 Traffic and Dust Control; Access	8-3
8-6	Underground Utilities Markout.....	8-4
8-7	Initial Clean-up During Construction	8-4
8-8	Final Clean-up.....	8-5
8-9	Right-of-Way Delays	8-5
8-10	Temporary Suspension of Work	8-6
8-11	Time of Completion.....	8-6
8-12	Liquidated Damages	8-6
8-13	Cooperation.....	8-7
8-14	Termination of Contract.....	8-7
8-15	Acceptance of Contract.....	8-9

SECTION 9 – MEASUREMENT AND PAYMENT

9-1	Measurement Of Quantities	9-1
9-2	Cost Breakdown.....	9-1
9-3	Final Pay Items	9-2
9-4	Scope Of Payment.....	9-2
9-5	Payment For Extra Work	9-2
9-6	Notice of Potential Claim.....	9-4
9-7	Progress Payments and Retentions	9-4
9-8	Substitutions for Five (5) Percent Retention.....	9-4
9-9	Stop Notices; District’s Right to Withhold Payments	9-5
9-10	Final Payment	9-7
9-11	Claims	9-8
	9-11.01 Claims Submittal	9-8
	9-11.02 Claims Less Than \$50,000	9-9
	9-11.03 Claims of \$50,000 to \$375,000	9-9
	9-11.04 Claims Greater Than \$375,000.....	9-9
	9-11.05 Meet and Confer Request	9-10
	9-11.06 Claim Final Determination	9-10
	9-11.07 Government Code Formal Claim	9-10
	9-11.08 Support For Arbitration Award	9-11
	9-11.09 Each Party To Bear Costs of Arbitration Or Litigation.....	9-11

SECTION 10 – UNDERGROUND UTILITIES

10-1	Underground Utility Locations, Markout	10-1
10-2	Utility Facilities Not Shown on Plans; Mains and Trunklines	10-1
10-3	Protection	10-2

SECTION 10 (Cont'd)	PAGE
10-4 Relocation	10-3
10-5 Utility Conflicts	10-3
10-6 Limitations of District Liability	10-3

TECHNICAL PROVISIONS

SECTION 11 – REINFORCEMENT	PAGE
11-1 General	11-1
11-2 Materials	11-1
11-2.01 Bar Reinforcement.....	11-1
11-2.02 Welded Wire Fabric.....	11-1
11-3 Cleaning	11-1
11-4 Bending.....	11-1
11-5 Placing.....	11-1
11-6 Splicing.....	11-2
11-7 Inspection.....	11-2
11-8 Measurement and Payment.....	11-2

SECTION 12 – PORTLAND CEMENT CONCRETE; CEMENT MORTAR

12-1 General.....	12-1
12-2 Materials	12-1
12-2.01 Cement.....	12-1
12-2.02 Water	12-1
12-2.03 Coarse Aggregate	12-2
12-2.04 Fine Aggregate	12-2
12-2.05 Ready-mixed Concrete	12-3
12-2.06 Admixtures	12-4
12-2.06.1 Calcium Chloride.....	12-4
12-2.06.2 Air-Entraining Agent.....	12-4
12-3 Amount of Water and Slump Test	12-4
12-4 Placing and Protecting Concrete.....	12-5
12-5 Forms	12-5
12-6 Curing Concrete	12-6
12-7 Vibrators	12-6
12-8 Cement Mortar	12-6
12-9 Certificate of Compliance; Samples	12-6
12-10 Measurement and Payment.....	12-7

SECTION 13 – CLEARING AND GRUBBING

13-1 General.....	13-1
13-2 Protection of Existing Improvements	13-1
13-3 Construction.....	13-1
13-4 Payment.....	13-2

SECTION 14 – TRENCH AND STRUCTURE EXCAVATION, RETENTION BASIN EXCAVATION AND GRADING

14-1 General..... 14-1
14-2 Permits 14-1
14-3 Trench and Structure Excavation..... 14-1
14-4 Retention Basin Excavation..... 14-3
14-5 Maintaining Drainage, Trench and Structure Excavation..... 14-4
14-6 Maintaining Drainage, Retention Basin Excavation..... 14-4
14-7 Disposal of Excess Materials 14-5
14-8 Payment..... 14-5

SECTION 15 – TRENCH AND STRUCTURE BACKFILL, RETENTION BASIN EMBANKMENT CONSTRUCTION

15-1 General..... 15-1
15-2 Material..... 15-1
 15-2.01 Native Material 15-1
 15-2.02 Imported Material 15-1
 15-2.03 Slurry Cement Backfill..... 15-1
15-3 Bedding..... 15-2
15-4 Trench Backfill, General..... 15-3
 15-4.01 Trench Backfill, Cast-in-Place Concrete Pipe..... 15-3
 15-4.02 Trench Backfill, Pre-Cast Pipe 15-3
 15-4.02.1 Initial Backfill, RCP 15-4
 15-4.02.1(A) Special Initial Backfill, RCP..... 15-4
 15-4.02.2 Initial Backfill, PVC Pipe..... 15-5
 15-4.02.2(A) Special Initial Backfill, PVC Pipe..... 15-5
 15-4.02.3 Initial Backfill, CMP 15-5
 15-4.02.4 Haunching and Initial Backfill, HDPE Plastic Pipe 15-6
 15-4.03 Final Backfill, Pre-cast Pipe 15-6
15-5 Structure Backfill 15-7
15-6 Embankment Construction, Retention Basins 15-7
15-7 Emergency Backfill 15-8
15-8 Compaction..... 15-8
15-9 Maintaining Drainage, Retention Basin Embankment Construction..... 15-9
15-10 Measurement and Payment..... 15-10

SECTION 16 – RESTORATION OF SURFACES

16-1 General..... 16-1
16-2 Temporary AC Pavement Replacement..... 16-1
16-3 Permanent AC Pavement Replacement 16-1
 16-3.01 Materials 16-2
 16-3.02 Pavement Removal and Replacement Limits..... 16-2
 16-3.03 Edge Trimming, Sawcutting..... 16-2
 16-3.04 Paint Binder (Tack Coat) and Seal Coat..... 16-3
 16-3.05 Construction..... 16-4

SECTION 16 (Cont'd)		PAGE
16-4	Miscellaneous Surface Restoration.....	16-4
16-5	Traffic Markings Replacement	16-5
16-6	Measurement and Payment.....	16-5

SECTION 17 – REINFORCED CONCRETE PIPE (RCP)

17-1	General.....	17-1
17-2	Materials, Pipe	17-1
	17-2.01 Pipe Substitutions	17-1
17-3	Materials, Joints	17-2
	17-3.01 Cement Mortar Joints	17-2
	17-3.02 Rubber-Gasket Joints.....	17-2
17-4	Installation.....	17-3
	17-4.01 Excavation	17-3
	17-4.02 Bedding.....	17-3
	17-4.03 Pipe Laying.....	17-3
	17-4.04 Construction Joints	17-4
	17-4.05 Initial Backfill and Compaction	17-4
	17-4.05.1 Special Initial Backfill.....	17-4
	17-4.06 Final Backfill and Compaction.....	17-4
	17-4.07 Minimum Cover (Depth).....	17-4
17-5	Curved Alignments	17-5
17-6	Protection of Pipe.....	17-5
17-7	Video Inspection	17-5
17-8	Measurement and Payment.....	17-5
17-9	Payment Retention	17-6

SECTION 18 – POLYVINYL CHLORIDE PIPE (PVC)

18-1	General.....	18-1
18-2	Materials	18-1
	18-2.01 PVC Gravity Sewer Pipe and Fittings	18-1
	18-2.02 PVC Irrigation Pipe and Fittings	18-2
	18-2.03 Joints.....	18-3
18-3	Installation.....	18-3
	18-3.01 Excavation	18-3
	18-3.01.1 Trench Widths	18-3
	18-3.02 Bedding.....	18-4
	18-3.03 Pipe Laying.....	18-4
	18-3.03.1 Floation Prevention.....	18-4
	18-3.04 Construction Joints	18-4
	18-3.05 Initial Backfill and Compaction	18-5
	18-3.05.1 Special Initial Backfill.....	18-5
	18-3.06 Slurry Cement Initial Backfill	18-5
	18-3.07 Final Backfill and Compaction.....	18-5
	18-3.08 Minimum Cover (depth).....	18-5
18-4	Curved Alignments	18-6

SECTION 18 (Cont'd)		PAGE
18-5	Protection of Pipe.....	18-6
18-6	Testing.....	18-6
18-7	Measurement and Payment.....	18-7
18-8	Payment Retention.....	18-8

SECTION 19 – CAST-IN-PLACE CONCRETE PIPE		PAGE
19-1	General.....	19-1
19-2	Materials	19-1
	19-2.01 Pipe Substitutions	19-1
19-3	Nominal Internal Diameter	19-2
19-4	Wall Thickness.....	19-2
19-5	Excavation.....	19-2
19-6	Bedding.....	19-2
19-7	Pipe Construction, Feasibility.....	19-3
19-8	Pipe Construction.....	19-3
19-9	Construction Joints.....	19-4
19-10	Curing	19-4
19-11	Finish.....	19-5
19-12	Backfill and Compaction	19-5
19-13	Concrete Tests.....	19-5
19-14	Hydrostatic Tests	19-6
19-15	Protection of Pipe.....	19-6
19-16	Measurement and Payment.....	19-6
19-17	Payment Retention.....	19-7

SECTION 20 – JACKED PIPE		
20-1	General.....	20-1
20-2	Materials	20-1
20-3	Joints	20-2
20-4	Excavation of Jacking and Receiving Pits	20-2
20-5	Jacking and Boring	20-3
20-6	Hydrostatic Test	20-4
20-7	Frac-Out Contingency Plan.....	20-5
20-8	Backfill and Compaction of Jacking and Receiving Pits, Restoration of Surfaces	20-5
20-9	Measurement and Payment.....	20-6

SECTION 21 – CORRUGATED METAL PIPE (CMP)		
21-1	General.....	21-1
21-2	Materials	21-1
21-3	Excavation.....	21-1
21-4	Bedding.....	21-1
21-5	Initial Backfill and Compaction.....	21-2
	21-5.01 Floatation Prevention.....	21-2
21-6	Final Backfill and Compaction	21-2
21-7	Minimum Cover (depth)	21-2

SECTION 21 (Cont'd)	PAGE
21-8 Protection of Pipe.....	21-3
21-9 Measurement and Payment.....	21-3
21-10 Payment Retention.....	21-3

SECTION 22 – HIGH DENSITY POLYETHYLENE (HDPE) PLASTIC PIPE	PAGE
22-1 General.....	22-1
22-2 Materials.....	22-1
22-2.01 Pipe and Fittings.....	22-1
22-2.02 Joints.....	22-1
22-3 Installation.....	22-2
22-3.01 Excavation.....	22-2
22-3.02 Bedding.....	22-2
22-3.03 Pipe Laying.....	22-3
22-3.03.1 Floatation Prevention.....	22-3
22-3.04 Construction Joints.....	22-3
22-3.05 Haunching, Initial Backfill, and Compaction.....	22-4
22-3.06 Slurry Cement Haunching and Initial Backfill.....	22-4
22-3.07 Final Backfill and Compaction.....	22-4
22-3.08 Minimum Cover.....	22-4
22-4 Curved Alignments.....	22-5
22-5 Protection of Pipe.....	22-5
22-6 Testing.....	22-5
22-7 Measurement and Payment.....	22-7
22-8 Payment Retention.....	22-8

SECTION 23 – MANHOLES

23-1 General.....	23-1
23-2 Materials.....	23-1
23-3 Excavation.....	23-1
23-4 Forms.....	23-1
23-5 Construction.....	23-1
23-6 Backfill and Compaction.....	23-2
23-7 Curing.....	23-2
23-8 Raising to Grade.....	23-3
23-9 Payment.....	23-3

SECTION 24 – STORM DRAIN INLETS AND OUTLETS

24-1 General.....	24-1
24-2 Materials.....	24-1
24-3 Forms.....	24-1
24-4 Excavation.....	24-1
24-5 Construction.....	24-1
24-6 Backfill and Compaction.....	24-3
24-7 Protection of Inlets or Outlets.....	24-3
24-8 Curing.....	24-3

SECTION 24 (Cont'd)	PAGE
24-9 Payment.....	24-3

SECTION 25 – OUTFALL STRUCTURES	PAGE
25-1 General.....	25-1
25-2 Materials	25-1
25-3 Excavation.....	25-1
25-4 Forms	25-2
25-5 Construction.....	25-2
25-6 Curing	25-2
25-7 Backfill and Compaction	25-2
25-8 Fenced Outfall Cages.....	25-2
25-9 Modified Fence/Pipe Outfall Cages.....	25-3
25-10 Trash Racks.....	25-3
25-11 Damage to Galvanized Materials.....	25-3
25-12 Measurement and Payment	25-3

SECTION 26 – PUMP FACILITIES	
26-1 General.....	26-1
26-2 Vertical Mixed Flow or Axial Flow Impeller Type Pump	26-1
26-2.01 Description.....	26-1
26-2.02 Bowl Assembly.....	26-1
26-2.03 Impeller and Shaft	26-2
26-2.04 Discharge Column Assembly	26-2
26-2.05 Lineshafts.....	26-3
26-2.06 Motor Base Assembly	26-4
26-2.07 Wrenches and Special Tools.....	26-5
26-2.08 Pump Motor.....	26-5
26-2.09 Assembly Drawings and Installation Instructions	26-5
26-3 Pump Sump.....	26-5
26-3.01 Materials	26-5
26-3.02 Forms	26-5
26-3.03 Excavation	26-6
26-3.04 Placing Concrete.....	26-6
26-3.05 Backfill and Compaction.....	26-6
26-3.06 Sump Ladder.....	26-6
26-4 Concrete Slab.....	26-7
26-5 Floor Grating.....	26-7
26-6 Control Structure.....	26-7
26-7 Discharge Structure.....	26-7
26-8 Reinforced Concrete Pipe	26-8
26-9 Trash Rack	26-8
26-10 Fence Enclosure	26-8
26-11 Security Lights.....	26-8
26-12 Measurement and Payment:.....	26-9

SECTION 27 – CURBS, GUTTERS, VALLEY GUTTERS, SIDEWALKS, AND MOWSTRIPS		PAGE
27-1	General	27-1
27-2	Materials	27-1
27-3	Subgrade Preparation	27-1
27-4	Existing Curbs, Gutters, Valley Gutters, Sidewalks and Mowstrip.....	27-1
27-5	Forms	27-1
27-6	Expansion Joints	27-2
27-7	Construction of Curbs and Gutters	27-3
27-8	Construction of Sidewalks and Mowstrips	27-3
27-9	Construction of Valley Gutters	27-4
27-10	Curing	27-4
27-11	Backfill and Compaction	27-4
27-12	Measurement and Payment.....	27-4

SECTION 28 – CHAIN LINK FENCE AND GATES

28-1	General.....	28-1
28-2	Materials	28-1
	28-2.01 Height	28-1
	28-2.02 Fabric.....	28-1
	28-2.02.1 Galvanized Fabric.....	28-1
	28-2.02.2 Vinyl Coated Galvanized Fabric	28-1
	28-2.03 Posts and Braces	28-2
	28-2.03.1 Alternative Pipe.....	28-2
	28-2.04 Extension Arms	28-3
	28-2.05 Tension Wire, Tie Wire	28-3
	28-2.06 Barbed Wire.....	28-3
	28-2.07 Gates	28-3
	28-2.08 Post Footings	28-4
28-3	Clearing and Grubbing.....	28-4
28-4	Excavation and Embankment Construction.....	28-4
28-5	Construction.....	28-4
28-6	Damage to Galvanized Materials.....	28-5
28-7	Measurement.....	28-6
28-8	Payment.....	28-6

SECTION 29 – ORNAMENTAL METAL FENCE AND GATES

29-1	General.....	29-1
29-2	Materials	29-1
	29-2.01 Height	29-1
	29-2.02 Pickets.....	29-1
	29-2.03 Horizontal Rails.....	29-1
	29-2.04 Posts.....	29-2
	29-2.04.1 Line Posts	29-2
	29-2.04.2 Corner, End, and Gate Posts	29-2
	29-2.05 Post Footings	29-2

SECTION 29 (Cont'd)	PAGE
29-3 Fabrication	29-2
29-3.01 Fence Panels	29-2
29-3.02 Gate Panels	29-3
29-4 Construction	29-3
29-5 Finish Coating	29-4
29-6 Excavation and Embankment Construction	29-4
29-7 Measurement	29-4
29-8 Payment	29-5

SECTION 30 – LANDSCAPE IRRIGATION SYSTEM	PAGE
30-1 General	30-1
30-2 Permits	30-1
30-2.01 Permit Inspections	30-2
30-2.02 Work Inspections	30-2
30-3 Intent of Design	30-2
30-3.01 Project Plans	30-3
30-4 Materials	30-3
30-4.01 Substitutions	30-3
30-4.02 PVC Pipe	30-4
30-4.03 PVC Fittings	30-5
30-4.04 Plastic Pipe Cement	30-5
30-4.05 Galvanized Iron Pipe and Fittings	30-5
30-4.06 Risers and Nipples, Swing Joints	30-5
30-4.07 Sprinkler Heads, Rotors, Spray Nozzles, Bubblers	30-6
30-4.08 Automatic Control Valves	30-6
30-4.09 Control Wiring (24 Volt)	30-6
30-4.10 Automatic Controllers	30-6
30-4.11 Gate Valves	30-6
30-4.12 Valve Boxes	30-7
30-4.13 Water Meter Boxes	30-7
30-4.14 Backflow Prevention Devices	30-7
30-4.15 Pressure Regulating Valve	30-7
30-4.16 Booster Pump	30-7
30-4.17 Recycled Water Pump	30-8
30-4.18 Electrical Power Supply	30-8
30-4.19 Remote Control Telemetry	30-8
30-4.20 Concrete	30-8
30-5 Handling of Materials	30-8
30-6 Grading	30-8
30-7 Irrigation System Installation	30-9
30-7.01 Description	30-9
30-7.02 System Excavation	30-9
30-7.03 PVC Pipe Installation	30-10
30-7.04 PVC to PVC Pipe Jointing	30-11
30-7.05 PVC to Galvanized Pipe Connections	30-12

SECTION 30 (Cont'd)	PAGE
30-7.06 Galvanized to Galvanized Pipe Connections.....	30-12
30-7.07 Sprinkler Heads, Rotors, Spray Nozzles, Bubblers Installation	30-12
30-7.08 Control Wiring Installation.....	30-12
30-7.09 Automatic Control Valve Installation.....	30-13
30-7.10 Valve Box Installation	30-13
30-7.11 Assemblies Installation.....	30-14
30-7.12 System Backfill.....	30-14
30-8 Automatic Controller Installation	30-14
30-9 Power Supply Installation	30-15
30-10 Water Supply Connection	30-15
30-11 Booster Pump Installation.....	30-16
30-12 Recycled Water Pump Installation.....	30-17
30-13 Pressure Test	30-17
30-13.01 Sprnkler Coverage Test	30-17
30-14 System Operations Test	30-18
30-15 As-Built Drawings	30-18
30-16 Operations and Maintenance Manual	30-19
30-17 System Guarantee	30-19
30-18 Measurement and Payment.....	30-20

SECTION 31 – LANDSCAPE PLANTING (TURF AND TREES)

31-1 General.....	31-1
31-2 Plant Availability	31-2
31-3 Site Conditions.....	31-2
31-4 Materials	31-2
31-4.01 Materials List.....	31-2
31-4.02 Soil Amendment	31-2
31-4.03 Fertilizer.....	31-3
31-4.04 Superphosphate.....	31-3
31-4.05 Gypsum.....	31-3
31-4.06 Mulch (Tree and Shrub Basins).....	31-4
31-4.07 Staking Material	31-4
31-4.08 Plants	31-4
31-4.09 Tree Trunk Protector	31-5
31-4.10 Turf Seed	31-5
31-4.11 Other Materials	31-5
31-5 Grading	31-5
31-6 Preliminary Irrigation System Testing.....	31-5
31-7 Soil Preparation.....	31-6
31-7.01 Soil Conditioning.....	31-6
31-8 Tree and Shrub Planting.....	31-7
31-8.01 Tree/Shrub Planting Holes.....	31-7
31-8.02 Pruning.....	31-8
31-8.03 Tree Staking.....	31-8
31-8.04 Pre-Emergent Application	31-8

SECTION 31 (Cont'd)	PAGE
31-9 Turf Planting	31-8
31-9.01 Sowing Seed	31-8
31-9.01.1 Fertilizing After Seeding	31-9
31-9.02 Hydromulching.....	31-9
31-9.02.1 Mix Preparation	31-9
31-9.02.2 Application Rate	31-10
31-9.03 Watering	31-10
31-10 Initial Clean-up	31-11
31-11 Maintenance Period and Final Clean-up.....	31-11
31-12 Measurement and Payment.....	31-13

SECTION 32 – PAINTING

32-1 General.....	32-1
32-2 Materials	32-1
32-2.01 Metal Etch.....	32-1
32-2.02 Metal Primer	32-1
32-2.03 Finish Coat.....	32-1
32-3 Application.....	32-1
32-4 Payment.....	32-2

SECTION 33 – MISCELLANEOUS FACILITIES AND OPERATIONS

33-1 General.....	33-1
33-2 Materials	33-2
33-3 Performance	33-2
33-4 Measurement and Payment.....	33-2

INDEX OF TERMS.....Index-1

STANDARD PLANS.....Table of Contents

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

STANDARD SPECIFICATIONS

April 1, 2011

SECTION 1 – DEFINITIONS AND TERMS

1-1 General

Unless the context otherwise requires, wherever in these Standard Specifications, hereinafter “Specifications” or “these Specifications”, and other Contract Documents the following abbreviations and terms, or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in this Section 1.

Reference to a particular section in these Specifications is made by section number and name without denoting “of these Specifications”. Any reference to standard specifications or standards of other agencies or organizations is so noted. Reference to California Department of Transportation (Caltrans) Standard Specifications shall mean the May 2006 edition, as may be amended.

1-2 Interpretation

These Specifications shall be interpreted pursuant to the plain meaning of its terms when read as a whole. In the event of a question as to its meaning, changes from the District’s Standard Plans and Specifications dated November 17, 1975 (as subsequently amended) may be considered. However, differences between these Specifications and similar documents of other entities shall not be considered.

1-3 Abbreviations

ASTM - American Society for Testing Materials
AASHTO - American Association of State Highway and Transportation Officials
BMP - Best Management Practices
Cal/EPA - California Environmental Protection Agency
Caltrans - California Department of Transportation
CWA - Federal Clean Water Act
DOT - U.S. Department of Transportation
EPA - U.S. Environmental Protection Agency
FID - Fresno Irrigation District
FMFCD - Fresno Metropolitan Flood Control District
NEMA - National Electrical Manufacturers Association
NPDES - National Pollutant Discharge Elimination System
SWPPP - Storm Water Pollution Prevention Plan

1-4 Acceptance

The written acknowledgment by the District that a contract has been substantially completed in all respects in accordance with the Plans, Special Provisions, these Specifications and any modifications thereof previously approved, through the issuance of a Notice of Acceptance of the Work, and the filing for recording of a Notice of Completion with the County Recorder's Office.

1-5 Approved

Whenever the term "approved" is used in these Standard Specifications or on the Standard Drawings, it shall refer to products, materials, devices, systems, or installations that have been approved, listed, labeled, or certified as conforming to applicable governmental or other nationally recognized standards, or applicable engineering and scientific principles.

1-6 Award of Contract

The District's determination of the Bidder to be presented the Contract for signature and performance.

1-7 Best Management Practices

Schedule of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce pollution related to construction activities. BMPs include, but are not limited to, treatment systems requirements, operating procedures, and practices to control site runoff, contaminant spillage or leaks, waste disposal, or drainage from raw material storage.

1-8 Bidder

Any individual, firm, partnership, joint venture, corporation, other entity (public or private), or combination thereof, submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.

1-9 Bidder's Proposal

The offer of the Bidder for the Work when prepared and submitted as required by the Notice to Contractors and the Instructions to Bidders on the prescribed proposal form, properly signed and guaranteed in accordance with these Specifications and the project Special Provisions.

1-10 Bidder's Proposal Form

The approved form upon which the District requires formal bids be prepared and submitted for the Work.

1-11 Bidder's Proposal Guaranty

The cash, cashier's check, certified check or bond accompanying a Bidder's Proposal, as a guaranty that the bidder will enter into a contract with the District for the performance of the Work if the contract is awarded to it.

1-12 Board

Board of Directors of the Fresno Metropolitan Flood Control District.

1-13 California Department of Transportation (Caltrans)

That division of the State of California organized to administer the affairs of the Department relating to transportation. Reference to Caltrans Standard Specifications shall mean the May 2006 edition, as amended.

1-14 California Manual on Uniform Traffic Control Devices (California MUTCD)

The State 2010 California MUTCD, or latest edition, for streets and highways. Supersedes the MUTCD and MUTCD California Supplement.

1-15 City

The local political subdivision where the Work is to be performed, i.e., the City of Fresno, California, and/or, the City of Clovis, California.

1-16 Clean Water Act

The Federal Water Pollution Act 33USC. 1251 et. seq., enacted by Public Law 92-500 as amended by Public Laws 95-217, 95-576, 96-483, and 97-117, and as may be further amended from time-to-time.

1-17 County

The County of Fresno when work is to be performed within its unincorporated area.

1-18 Contract

The written agreement covering the performance of the Work and the furnishing of labor, materials, tools and equipment in the construction of the Work, which shall include, without limitation, the Notice to Contractors, the successful Bidder's Proposal, these Standard Specifications, the Standard Plans, the Project Plans, the Special Provisions, the Contract Bonds, Insurance Certificates, any other document incorporated by reference therein, and supplemental agreements, written instructions or other documents modifying the Work or extending the time of completion thereof.

1-19 Contract Documents

All written information related to the Contract for the performance of the Work, whether in written words, diagrams, electronic format, or otherwise, including, without limitation, these Specifications, the Standard Plans, the Special Provisions, the Project Plans, permits issued by jurisdictional agencies, the Contract Bonds, Insurance Certificates, the Contract and any attachments or appendices thereto, and any Contract Change Orders issued by the Engineer.

1-20 Contractor

The individual, firm partnership, corporation, joint venture, other entity (private or public), or combination thereof, which has entered into a Contract with the District.

1-21 Days

Calendar days, unless otherwise defined in the Special Provisions.

1-22 Detour

A temporary route for traffic around a closed portion of road.

1-23 District

The Fresno Metropolitan Flood Control District (also referred to as “FMFCD”).

1-24 Engineer

The District Engineer, acting either directly or through an FMFCD authorized representative.

1-25 Engineer's Estimate

The list, if any, of estimated quantities of work to be performed as contained in the Bid Proposal Form.

1-26 Laboratory

Any entity authorized by the Engineer to test materials and/or work required in performance of the Contract.

1-27 Labor Code

The Labor Code of the State of California

1-28 Lateral

A pipeline which connects a storm drain inlet to the main storm drain; usually connected at a manhole.

1-29 Law

A statute or regulation, as it may be amended or replaced from time-to-time.

1-30 Legal Holidays

Those days designated as Federal or State Holidays in the California Government Code.

1-31 Liquidated Damages

The amount prescribed in the Special Provisions to be paid to the District or to be deducted from any payments due or to become due the Contractor for each day's delay in completing the whole or any specified portion of the Work beyond the time allowed in the Contract Documents. This term may also be applied to penalties imposed by these Specifications, the Special Provisions, or the Engineer for failure of the Contractor to meet certain performance standards or to perform certain tasks in accordance with the Contract Documents including permits issued by other agencies, or the directions of the Engineer.

1-32 National Pollutant Discharge Elimination System (“NPDES”)

A permitting process established pursuant to the Clean Water Act that regulates the release of pollutants to waters of the United States.

1-33 Pavement

The uppermost layer of material placed on the traveled way or shoulders of streets, roads, highways, driveways, or other access (public or private). This term is sometimes used interchangeably with surfacing.

1-34 Plans

The official Project Plans, profiles, cross sections, Standard Plans, working drawings and supplemental drawings, and other documents or reproductions thereof, approved by the Engineer, which show the location, character, dimensions and details of the work to be performed. All such documents are to be considered as a part of the Plans whether or not reproduced in the Special Provisions. Project Plans and Standard Plans are further defined as follows:

Project Plans – The Project Plans are specific details and dimensions peculiar to the Work to be performed pursuant to the Contract and are supplemented by the Standard Plans insofar as the same may apply.

Standard Plans – The Standard Plans of the Fresno Metropolitan Flood Control District depicting the construction details for the various District storm drain and related facilities. Standard Plans of other agencies referenced in these Specifications are so noted.

1-35 Project

The improvement(s) to be constructed or other Work to be performed pursuant to the Contract.

1-36 Public Contract Code

The California Law that places all public contract law in one code to make that law clearer and easier to find. Also referred to as the California Public Contract Code.

1-37 Special Provisions

The specific clauses setting forth conditions or requirements peculiar to the Work to be performed pursuant to the Contract and which are supplementary but superior to these Specifications.

1-38 Specifications

The conditions or requirements contained in these Standard Specifications as supplemented by the Special Provisions.

1-39 State

The State of California.

1-40 State General Construction Activities Storm Water Permit

The NPDES General Construction Activities Storm Water Permit, issued by the State Water Resources Control Board (Water Quality Order 99-08-DWQ), adopted August 1999, as may be amended from time-to-time.

1-41 Storm Water Pollution Prevention Plan (SWPPP)

A document required by the NPDES Permit which identifies sources and activities at a particular construction site that may contribute pollutants to storm water, and commits the Contractor and property owner to implement specific control measures to prevent or treat such pollutants.

1-42 Utility

Utility or utilities, shall mean any domestic water supply system, sanitary sewer system, storm drain system, reclaimed water system, agricultural irrigation system, or any underground facilities owned and operated by the Pacific Gas and Electric Company, telephone companies, cable television companies, underground communications companies including fiber optics, or any other public or private companies, corporations, or agencies which may reasonably be considered a utility.

1-43 Work

The furnishing of all labor, materials, services, and incidentals to complete the Project as bid or as amended by the District, whether or not expressly specified in the Contract.

1-44 Working Day

Unless otherwise defined in the Special Provisions, a Working Day shall be any day on which the Engineer determines that the Contractor is not prevented by inclement weather or conditions resulting immediately therefrom, or interference by other contractors required to be in the Work area, from proceeding with substantial prosecution of the Work, excluding Saturdays, Sundays, legal holidays, or any other day the Contractor is specifically required by the Special Provisions or written instruction by the Engineer to suspend construction operations.

SECTION 2 - PROPOSAL REQUIREMENTS AND CONDITIONS

2-1 General

The Engineer or his designee will receive at the office of the Fresno Metropolitan Flood Control District, prior to the hour and day specified in the Notice to Contractors, sealed proposals for furnishing material, supplies, equipment, and labor for performing the Work as specified in the Plans, these Specifications, and the Special Provisions. Proposals must be submitted before the hour specified for receipt of bids; proposals submitted at or after the hour specified for receipt of bids will be returned unopened.

2-2 Contents of Proposal Forms

Upon request, prospective bidders will be furnished with a Notice to Contractors, Instruction to Bidders, and proposal forms, which will refer to the Contract Documents including the Project Plans and Special Provisions, which may be purchased at the District Office. These documents will state the location and description of the contemplated construction, will show the Engineer's estimate of the various quantities and kinds of Work to be performed or materials to be furnished, and will include a schedule of items for which bid prices are asked. Bidders are required to furnish their California contractor's license classification and number on the Proposal Form. This license shall meet the minimum required license specified in the Notice to Contractors.

2-3 Engineer's Estimate of Quantities

Any estimate of quantities given in the Notice to Contractors and in the Bidder's Proposal Forms are approximate only, being given as a basis for the comparison of bids. The District does not, expressly or by implication, represent that the actual amount of work will correspond therewith, but reserves the right to increase or decrease the amount of any class or portion of the work or to omit portions of the work as may be deemed necessary or advisable by the Engineer.

The lump sums and/or unit prices shown by the Bidder in the bid proposal shall include full compensation for all Work and expenses appurtenant to the accomplishment of the Work described in the Plans, Special Provisions, and these Specifications, in the manner indicated therein, including all items delineated in the Contract documents for which specific bid items are not set up in the bid proposal. The Contractor shall proportionally spread all incidental costs associated with the Work for which there are no separate bid items into the amount bid for those items of Work for which there are bid items, and no separate or additional payment will be made for any requirement of the Contract not specifically listed on the bid proposal. No compensation will be made in any case for loss of anticipated profits.

2-4 Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site of Work

The Bidder is required to carefully examine the Plans, Standard Specifications, Special Provisions, and all other Contract Documents, and investigate the site of the proposed Work and satisfy itself as to the conditions to be encountered, as to the site and the character, quality, and quantities of Work to be performed and materials to be furnished, and as to the requirements of the Plans, these Specifications, Special Provisions, and other Contract documents. By submitting a bid, the Bidder is warranting that it has made such examination and investigation. The

Contractor shall comply with the requirements of Section 2-5, "Pre-Bid Tests", Section 14-3, "Trench and Structure Excavation", and 19-7, "Pipe Construction, Feasibility", regarding pre-bid testing and excavation/soil conditions, and Section 8-13, "Cooperation", as to the presence of other forces at the site of Work.

2-5 Pre-Bid Tests

The District makes no guarantee as to the types of soil or of soil conditions existing within a project limits. In accordance with Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site of Work", prior to submitting a bid proposal the prospective Bidder shall conduct any soils or other tests it deems necessary to make itself fully aware of the soil types or conditions which may prevail throughout the project site, and the effects they may have on the construction requirements or quantities of the various related bid items. Tests so performed shall be conducted at the Bidder's expense. If tests are to be conducted within the public right-of-way, the prospective Bidder shall contact the jurisdictional agency for any permit requirements. Tests on adjacent private property shall only be conducted only with the permission of the property owner. Submission of a bid shall be deemed conclusive evidence that the Contractor has conducted such tests or has otherwise satisfied itself as to site conditions.

Where the District has conducted soils investigations and has made such report available to prospective Bidders, the data provided therein is for the Bidder's information and convenience only. No representation is made thereby as to the feasibility of installing any pipeline or constructing any other underground facilities shown on the Plans.

2-6 Submitting Proposal Form

Pursuant to Section 2-2, "Contents of Proposal Forms", the District shall furnish to each prospective bidder a proposal form, which, when duly completed and executed, shall be submitted as its bid. Bids not presented on this form will be disregarded. All proposals shall give the prices proposed, both in writing and in figures, in the respective spaces provided. The unit or lump sum prices inserted in the proposal form by the Bidder will be considered to be the bid prices for the various bid items of Work to be performed. In case of a discrepancy between the unit price bid and the calculated total for any bid item, the unit price shall govern. In case of a discrepancy between the unit or lump sum price in words and figures provided on the proposal form, the unit or lump sum price quoted in words shall prevail over the figures. The proposal form, which includes all certifications and affidavits, shall be signed by the bidder, who shall fill out all blanks in the proposal form as therein required. The proposal form shall be submitted as specified in Section 2-1, "General", and the Contract Documents, under sealed cover plainly marked as a proposal, and identifying the Project to which the proposal relates and the name of the Bidder submitting the proposal. Proposals which are not properly marked and identified may be disregarded.

2-7 Proposal Guaranty

All sealed proposals shall also contain cash, a cashier's check, a certified check, or a bidder's bond of a corporate surety, made payable to the Fresno Metropolitan Flood Control District in an amount equal to at least ten (10) per cent of the amount of said bid. A bid will not be considered unless one of the forms of bidder's security is enclosed with it. The Contractor's attention is directed to Section 3-3, "Submission of Proof of Insurance".

2-8 Required Listing of Proposed Subcontractors

Each proposal shall have listed therein the name and address of each subcontractor to whom the bidder proposes to subcontract portions of the Work in an amount in excess of one-half of one (½) percent of the total bid in accordance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code. No subcontractor shall be listed which is not licensed pursuant to the California Business and Professions Code, Division 3, Chapter 9, as amended, to perform the Work proposed to be subcontracted. Reference is made to Section 7-9, "Contractor's Licensing Laws".

The Contractor to whom a Contract is awarded shall perform, with the Contractor's own organization, Contract Work amounting to not less than fifty (50) percent of the original Contract price. To determine the value of Work subcontracted, where an entire contract item is subcontracted, the value of the Work subcontracted will be based on the Contract item bid price. When a portion of an item is subcontracted, the value of the Work subcontracted will be based on the estimated percentage of the Contract item bid price, determined from information submitted by the Bidder, subject to approval by the Engineer.

Only one subcontractor shall be listed for each portion of the Work. The portion of the Work shall be defined by the Bidder as to its nature and extent. Failure of the Bidder to specify a subcontractor constitutes a statement that the Bidder is qualified and intends to perform said Work. Designation of subcontractors shall be made upon a form provided by the District and which shall be signed by the Bidder and submitted with the bid proposal form.

Once the bid proposal has been accepted by the District, substitution of a subcontractor will not be permitted, except as provided in Section 4107 of the Public Contract Code, and then only with the approval of the Engineer. In accordance with Section 4106 of said Code, if a Prime Contractor fails to specify a subcontractor or if more than one subcontractor is specified for the same work to be performed under the Contract in excess of one half of one (½) percent of the Prime Contractor's total bid, the Prime Contractor agrees that it is fully qualified to perform that portion of the Work itself, and that the Prime Contractor shall perform that portion itself, except as provided in Section 8-3, "Subcontracting".

The bidder shall comply with all other provisions of said Act including, but not limited to, those related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.

2-9 Withdrawal of Proposals

A bid may be withdrawn at any time prior to the time fixed in the Notice to Contractors for the opening of bids only by written or telecopy request by the Bidder for such withdrawal filed with the District. E-mail withdrawals shall not be effective. The withdrawal of a bid does not prejudice the right of the bidder to file a new bid. Once said time fixed for opening of bids has expired, no bid may be withdrawn. Furthermore, unless all bids are rejected by the Board, except as provided above for withdrawal of bids prior to the time fixed for the opening of bids, no bidder may withdraw its bid until the expiration of sixty (60) days after the date set for the opening thereof or until the contract has been executed and the required contractor's bonds furnished by the successful bidder or bidders, whichever first occurs.

2-10 Opening of Proposals

Proposals shall be opened and read publicly by the District at the place indicated in the Notice to Contractors in and at the time indicated in said Notice, or as soon as possible thereafter. Whether or not bids are opened exactly at the time fixed for opening bids, a bid will not be received at or after that time, nor may a bid be withdrawn after the time fixed for the opening of bids. Bidders or their authorized agents are invited to be present.

2-11 Disqualification of Bidders

Pursuant to State Public Contract Code Section 7106, the Bidder shall execute and submit the Noncollusion Affidavit included with the bid proposal form. Failure of the Bidder to execute and submit the affidavit shall be grounds for the District to reject the bid proposal.

More than one proposal for the same unit or units from an individual, firm, partnership, corporation, or combination thereof under the same or different names will not be considered, except an alternative bid when called for by the District. Reasonable grounds for believing that any individual, firm, partnership, corporation, or combination thereof is interested in more than one proposal for the Work contemplated may cause rejection of all proposals in which that individual, firm, partnership, corporation, or combination thereof is interested. If there is reason for believing that collusion exists among the bidders, such proposals may be rejected. Bidder's proposals in which the prices obviously are unbalanced may be rejected.

2-12 Rejection of Proposals

Proposals may be rejected if they show any alteration of form, additions not called for, conditional or alternative bids, incomplete bids, erasures, or irregularities of any kind. The District reserves the right to reject any and all proposals.

2-13 Relief of Bidders

Attention is directed to the provisions of Public Contract Code Sections 5100 to 5107, inclusive, concerning relief of Bidders and in particular to the requirement therein, that if the Bidder claims a mistake was made in the bid presented, the Bidder shall give the District written notice within five (5) days after the opening of the bids of the alleged mistake, specifying in the notice in detail how the mistake occurred.

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

3-1 Award of Contract

The District reserves the right to reject any and all bids, to award or reject any combination of items as it sees fit, and to waive any informality in any bid received. The award of a Contract, if it is awarded, shall be to the lowest responsible Bidder whose proposal complies with all the requirements prescribed in Section 2, "Proposal Requirements and Conditions". Such award, if made, will be made within the period of time following the opening of bids as specified in the Special Provisions.

If the lowest responsible Bidder refuses or fails to execute the Contract, the District may award the contract to the second lowest Bidder. Unless otherwise specified in the Special Provisions, the award, if made, will be made within forty-five (45) days after the opening of proposals. If the second lowest responsible Bidder refuses or fails to execute the contract, the District may award the contract to the third lowest responsible bidder. The award, if made, will be made within sixty (60) days after the opening of proposals. The periods of time specified above within which the award of the contract may be made will be subject to extension for further periods agreed upon in writing between the District and the particular bidder concerned.

All bids will be compared on the basis of the Engineer's Estimate of the quantities of Work to be done as shown on the Bidder's Proposal Form. Where bid alternates are included, or multiple units are bid together, bids must be submitted on all alternates or units in order to be considered responsive.

Reference is made to Section 7-9, "Contractor's Licensing Laws". No Contract will be awarded to a Contractor who is not licensed in accordance with the provisions of the Contractor's State License Law, California Business and Professions Code, as amended, and whose license classification is not in accordance with the Notice to Contractors in the Bid Proposal Form.

3-2 Award of Contracts with Multiple Construction Units

If there are two or more units in the construction project and the Notice to Contractors has called for separate proposals for each unit, the District reserves the right to award a Contract for one unit or a contract for more than one unit to one Bidder, while awarding a Contract or Contracts to other Bidders for other units or combinations of units.

3-3 Submission of Proof of Insurance

Proof of Insurance (Certificate of Insurance) complying with Section 7-13.02(6), "Evidence of Coverage", and certifying coverage in the minimum amounts specified in Section 7-13, "Insurance", and the Special Provisions, shall be submitted to the District before 5:00 p.m. on the second business day following the opening of bids, or as extended in writing by the District. To allow time for District review of the required coverages, and for the Bidder to have any necessary coverage revisions made to assure that minimum coverage requirements are met before the foregoing deadline expires, Bidders are encouraged to submit their proof of coverage at the time of the bid opening. Insurance Carriers must have a current A.M. Best rating of no lower than A:VII or equivalent as approved by the District. Surety shall be listed as approved for operation in the State by the California Department of Insurance.

3-4 Execution of Contract

After award of the Contract by the Board, the successful Bidder shall sign the Contract and return it, together with the contract bonds, within ten (10) days after the Bidder has received notice that the Contract has been awarded, and has received the Contract for execution. No proposal shall be considered binding upon the District until the District executes the Contract. Reference is made to Section 8-4, "Assignment".

3-5 Contractor's Bonds

Concurrently with its execution of the Contract, the Bidder to whom the Contract has been awarded shall furnish a Payment Bond in an amount not less than one hundred (100) percent of the Contract price, and a Performance Bond in an amount equal to one hundred and ten (110) percent of the Contract price. The bond forms shall be those included in the Special Provisions (or as otherwise provided by the District). Said bonds shall be secured by a corporate surety or sureties included on the State of California Department of Insurance Admitted Sureties List, most current edition, and acceptable to the District. Said surety or sureties shall have an A.M. Best rating no lower than A:VII, or as otherwise approved by the District, which rating shall be verifiable by the District. Surety must produce with the executed bond(s) the original or a certified copy of the un-revoked power of attorney, bylaws, or other instrument that authorizes the person executing the bond(s) to do so.

3-6 Failure to Execute Contract

Failure of a successful Bidder to execute the Contract and file the necessary bonds as provided herein within ten (10) days after such Bidder has received notice that the Contract has been awarded to it shall be just cause for the annulment of the award and the forfeiture of the Bidder's Proposal Guaranty provided pursuant to Section 2-7, "Proposal Guaranty".

3-7 Return of the Proposal Guaranty

Within ten (10) days after the bid opening, the District shall return the Proposal Guaranties accompanying any Proposals, which were not considered but were rejected by reason of irregularities or other disqualification. All other proposal guaranties will be held until the Contract has been executed by the District and the required Insurance Certificate and Contractor's Bonds have been furnished by the successful Bidder(s) after which said Proposal Guaranties will be returned to the respective Bidders whose proposals they accompanied.

3-8 Materials Statement, Samples

When specified in the Special Provisions, before the Contract is awarded, the Bidder may be required to furnish a complete statement of the origin, composition, and manufacturer of any or all materials proposed to be used in the construction of the Work together with samples which may be subject to tests provided for in these Specifications or other tests specified in the Special Provisions to determine their quality and fitness for the Work.

SECTION 4 - SCOPE OF WORK

4-1 Intent of Plans and Specifications

Reference is made to Section 5-3, “Plans and Working Drawings”, and Section 5-4, “Interpretation of Plans, Standard Specifications, and Special Provisions; Precedence”. The intent of the Plans, Specifications, Special Provisions, and other Contract Documents is to prescribe the details of the Work, which the Contractor undertakes to perform in accordance with the terms of the Contract. Where such documents describe portions of the Work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the Work involved in executing the Contract in a satisfactory and workmanlike manner.

4-2 Work to be Done

The Contractor shall furnish all labor, materials, equipment, supplies, transportation, and perform and complete all the Work required by the Contract within the time specified therein in a workmanlike manner and to the satisfaction of the Engineer.

4-3 Changes

The District reserves the right to make such alterations, deviations, additions to, or deletions from the Contract, including the right to increase or decrease the quantity of any item or portion of the Work, or to delete any item or portion of the Work as may be deemed by the Engineer to be necessary or advisable, and to require such extra Work as may be determined by the Engineer to be required for the proper completion or construction of the whole Work contemplated.

Upon written order of the Engineer, the Contractor shall proceed with the Work as increased, decreased, or altered, and those Changes shall be set forth in a Contract Change Order which shall specify (i) the Work to be added or deleted in connection with the change made, (ii) any adjustment to date of completion specified in the Contract, and (iii) the basis of any adjustment to the compensation, except that no adjustment will be made in the contract unit price of any contract item as a result of quantity changes, regardless of the amount of the increase or decrease, including deletion, of any contract item or items. A Contract Change Order shall not become effective until approved by the Engineer.

4-4 Extra Work

New or unforeseen work will be classed as Extra Work when the Engineer determines that such work is not covered by any of the various items or combination of items for which there is a bid price.

No Extra Work shall be done by the Contractor except upon receipt of a written order from the Engineer. For such Extra Work, the Contractor shall receive payment as previously agreed upon in writing, or it shall be paid for on a force account basis, all in accordance with Section 9-5, “Payment for Extra Work”.

SECTION 5 - CONTROL OF WORK

5-1 Authority of the Engineer

The Engineer shall decide any and all questions which may arise as to the quality and acceptability of the Work performed, the quality and acceptability of materials furnished, the manner of performance and rate of progress of the Work, the interpretation of the Contract Documents, the acceptable fulfillment of the Contract on the part of the Contractor, and compensation to the Contractor. The Engineer's decisions shall be final, and the Engineer shall have authority to enforce his decisions and orders.

5-2 Performance to be in Accord with the True Intent

The Contractor shall perform and complete the Work in conformity with the true meaning and intent of the Contract Documents.

5-3 Plans and Working Drawings

Reference is made to Section 4-1, "Intent of Plans and Specifications", and Section 5-4, "Interpretation of Plans, Standard Specifications, and Special Provisions; Precedence". The Plans furnished consist of general drawings and show such details as are necessary to give a comprehensive idea of the construction contemplated. All authorized alterations or changes affecting the requirements and information given on the Plans shall be in writing.

In addition to the Plans incorporated in the Contract at the time of signing, the Engineer may furnish such other drawings from time-to-time as may be necessary to clarify and to define in greater detail the intent of the Plans, these Specifications, and the Special Provisions; the Contractor shall make the Work conform to all such drawings.

The Contractor may be required by these Specifications, Special Provisions, or the Engineer, to prepare such Working Drawings or shop drawings as are necessary to adequately control or detail the Work. All working or shop drawings and corrections thereto shall be prepared in accordance with current engineering practices and at the Contractor's expense.

Where working or shop drawings are required by the Special Provisions to be approved by the Engineer prior to beginning the Work requiring such drawings, unless otherwise specified, four (4) copies of working or shop drawings shall be submitted to the Engineer for approval or correction at least ten (10) days before approved drawings will be required for such Work. If corrections are required, the Contractor shall make corrections as directed by the Engineer and shall deliver four (4) copies of the corrected working or shop drawings to the Engineer for further review and approval. Upon final approval, one (1) set will be returned to the Contractor marked "approved" or "approved as corrected". Working or shop drawings shall be of a size and scale to clearly show all necessary details.

The Contractor shall be responsible for the conformity of its working or shop drawings with the Contract Documents. Working or shop drawings or required details for any structure shall be approved by the Engineer before any Work involving same shall be performed, unless approval is waived in writing by the Engineer. Notwithstanding District approval of the Contractor's working or shop drawings, the Contractor shall be responsible for the accuracy of dimensions

and details, for any errors or omissions in the drawings and for any inconsistencies between the dimensions and the details. Approval of working or shop drawings shall not operate to waive any of the requirements of the Plans, these Specifications, the Special Provisions, or other Contract Documents, or relieve the Contractor of any obligation thereunder, and defective Work, materials, or equipment may be rejected notwithstanding such approval.

5-4 Interpretation of Plans, Standard Specifications, and Special Provisions; Precedence

Reference is made to Section 4-1, "Intent of Plans and Specifications", and Section 5-3, "Plans and Working Drawings". These Specifications, the Standard Plans, Project Plans, Special Provisions, Contract Change Orders, and all other Contract Documents are incorporated into the Contract, and a requirement occurring in one is as binding as though occurring in all. The Plans, Special Provisions, and these Specifications are intended to be mutually explanatory, and to describe and provide for a complete Work. Any Work indicated on the Plans and not in the Special Provisions or these Specifications, or vice versa, is to be executed as if indicated in all.

Whenever a conflict appears between any of the Contract Documents, the following order of precedence shall apply:

1. Requirements in permits from other agencies, unless requirements of the below listed documents are more restrictive.
2. Contract Change Orders or Supplemental Agreements.
3. Contract (sometimes called the Agreement).
4. Pre-bid Addenda.
5. Special Provisions.
6. Project Plans or approved working or shop drawings.
7. Standard Plans.
8. Standard Specifications.

Should it appear that the Work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Contract Documents, the Contractor shall apply, in writing, to the Engineer for further explanation as may be necessary, and shall conform to the explanation as part of the Contract.

Lists, rules, and regulations referred to are recognized printed standards and shall be considered as one and part of these Specifications within the limits specified. Catalog numbers shall be likewise so considered.

If the Contractor, during site investigation or the course of the Work, discovers any discrepancies between the Contract Documents, the conditions in the field, or any inconsistencies, errors, or omissions therein or in the layout given by stakes, points, or instructions, it shall be the Contractor's duty to inform the Engineer immediately in writing, and the Engineer shall promptly provide the Contractor written instructions on how to proceed. Any Work done after such discovery, and prior to receipt of such instructions, shall be done at the Contractor's risk.

5-5 Pre-Construction Conference, Notice to Proceed.

After all Contract documents have been submitted by the Contractor and the Contract executed by the District, a Pre-Construction Conference will be scheduled and conducted by the District for all projects. The Contractor, its supervisory personnel, and any desired subcontractor shall attend. All affected jurisdictional agencies and utility companies will be invited to attend. At this meeting, the Contractor shall submit all documents required after Contract execution by these Specifications and the Special Provisions including, but not limited to, copies of executed encroachment permits and approved traffic control plans from jurisdictional agencies, California Division of Industrial Safety (Cal OSHA) excavation Permit, where such permit is required, and the Contractor's proposed schedule of operations. At the satisfactory conclusion of this Pre-Construction Conference, the District will issue a Notice to Proceed, which will include, among other information, the start date for Work required under the Contract. The time allowed by the Special Provisions to complete the Work will begin as of the date given in such Notice. The cost of attending the Pre-Construction Conference shall be included in the various Contract items of Work, and no additional payment will be paid therefor.

5-6 Order of Work; Schedule of Operations

When required by the Special Provisions or the Project Plans, the Contractor shall follow the sequence of operations as set forth therein. Reference is made to Section 8-5, "Progress of the Work". The Contractor shall submit a proposed Schedule of Operations at the Pre-Construction Conference, or at any other time if required by the Engineer. The Contractor shall comply with Section 7-14, "Contractor's Responsibility for Work and Materials".

Full compensation for conforming with such requirements shall be considered as included in the prices paid for the various Contract items of Work, and no additional payment shall be allowed therefor.

5-7 Authorized Representative

The Contractor shall submit to the Engineer in writing, at the Pre-Construction Conference the name of an Authorized Representative who shall have complete authority to represent and act for the Contractor. Said Authorized Representative shall be present at the site of the Work at all times while Work is actually in progress on the Contract. During periods when Work is not in progress or suspended, arrangements acceptable to the Engineer shall be made for any emergency Work which may be required.

5-8 Emergency Availability

The Contractor shall furnish to the Engineer at the Pre-Construction Conference a list of persons, together with their addresses and home or other 24-hour telephone numbers, who are authorized to act on behalf of the Contractor in an emergency arising out of conditions at the Work site after normal working hours.

5-9 Surveying/Staking; Lines and Grades

All Work done under the Contract shall be to the Lines and Grades shown on the Project Plans. If field conditions indicate that the established Lines and Grades are not feasible, or if discrepancies are discovered between the Project Plans and the construction staking during the course of the Work, the Contractor shall promptly notify the Engineer in writing. No changes

shall be made without the express written approval of the Engineer. Any work done after such discovery, and prior to receipt of such approval, shall be done at the Contractor's risk. All Lines and Grades not set forth in the Contract Documents shall be determined by the Engineer.

The District shall provide at its expense original construction survey staking at the request of the Contractor. The Contractor shall give the Engineer at least three (3) working days advance written notice when requesting construction stakes for any portion of the Work. Said notice shall be given on forms provided in the Special Provisions and shall be signed by the Contractor. The Contractor shall not commence any construction without survey stakes in place. Thereafter, the Contractor shall be responsible for preserving construction stakes and marks. Any stakes disturbed or removed prior to the completion and inspection of the work controlled by said stakes shall be replaced by the District at the Contractor's expense calculated at the rate thereof specified in the Special Provisions. The cost for replacement will be deducted from monies owed the Contractor, or the Contractor may pay directly to the District.

An overtime surveying/staking charge shall be paid by the Contractor when such services are requested or required to occur during other than the normal daily eight (8) working hours or on Saturdays, Sundays, or District Holidays. Said charge shall be calculated at the rate thereof specified in the Special Provisions, and will be deducted from monies owed the Contractor, or the Contractor may pay the amount directly to the District.

Unless otherwise set forth in the Project Plans or Special Provisions, stakes shall be set and stationed by the Engineer for pipelines, structures, curbs, headers and finish dirt grade, with a corresponding cut or fill to finish grade (or flow line) indicated on a grade sheet.

5-10 Establishment and Maintenance of Marks and Stakes

The Contractor shall carefully preserve benchmarks, property line and corner survey markers, monuments, location reference points and stakes (collectively, "reference points"). The Contractor shall be responsible for any mistakes or expense that may be caused by the loss or disturbance of any reference points, including, without limitation, the cost to remove and reconstruct improvements constructed by the Contractor in the wrong location.

If any such reference point is removed, displaced, damaged, or destroyed, it shall be accurately replaced at the Contractor's expense by a person appropriately licensed by the State of California for Land Surveying before completion of the Work, all subject to the approval and acceptance of the Engineer.

5-11 Inspection During Construction

The Engineer, his duly appointed representatives, inspectors from permitting jurisdictional agencies, testing laboratories, or representatives of owners of facilities which may be affected by the Work, shall at all times be provided safe access to the Work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of the Contract Documents.

All Work done and all materials furnished shall be subject to the Engineer's inspection. Reference is made to Section 6-3, "Samples and Tests", for testing during construction. For those portions of the Work associated with new improvements, or existing improvements affected by the Work, which currently are or will be owned, operated, or maintained by other jurisdictional agencies, including those which have issued permits for the Work or utility companies, inspection will be carried out by said agencies concurrently with or separately from the District's inspection. The Contractor shall comply with the requirements of these inspectors as well as the District's inspector.

Whenever the Contractor varies the period during which Work is performed on each day, he shall give due notice to the Engineer so that proper inspection may be provided. Any Work done in the absence of the Engineer is subject to rejection.

An overtime inspection charge shall be paid by the Contractor when inspections are requested or required to occur during other than the normal daily eight (8) working hours or on Saturdays, Sundays, or District holidays. Said charge shall be calculated at the rate thereof specified in the Special Provisions, and will be deducted from monies owed the Contractor, or the Contractor may pay the amount directly to the District.

The inspection, approval and/or acceptance of the Work shall not relieve the Contractor of its obligations to fulfill the Contract. Defective Work shall be made to comply with the requirements of the Contract at the Contractor's expense, notwithstanding the fact that such defective Work may have been previously inspected by the Engineer and/or payment has been authorized therefor.

5-12 Alternative Methods of Construction

Whenever the Plans, these Specifications, Special Provisions, or other Contract Documents provide that more than one specified method of construction or more than one specified type of material or construction equipment may be used to perform portions of the Work and leave the selection of the method of construction or the type of material or equipment to be used up to the Contractor, it is understood that the District does not guarantee that every specified method of construction or type of material or equipment can be used successfully throughout all or any part of any project. It shall be the Contractor's responsibility to select and use the alternative or alternatives which will satisfactorily perform the Work under the conditions encountered. In the event some of the alternatives are not feasible or it is necessary to use more than one of the alternatives on any project, full compensation for any additional cost involved shall be considered as included in the contract price paid for the item of Work involved and no additional payment will be made therefor.

5-13 Removal of Defective, Rejected, or Unauthorized Work

Any work which is not authorized by the Contract Documents or the Engineer, or Work which is defective in its construction or has been rejected, shall be remedied or removed, and (in the case of defective or rejected work) replaced by the Contractor in a manner acceptable to the Engineer. Such removal and any replacement shall be at Contractor's own expense, and no compensation will be allowed to the Contractor for such remedy, removal or replacement.

Reference is made to Section 7-27, “Air Pollution, Contractor’s Equipment”, regarding removal of unsuitable equipment.

5-14 Subcontractor’s Operations

In addition to the requirements of Section 2-8, “Required Listing of Proposed Subcontractors”, and Section 8-3, “Subcontracting”, the Contractor shall be responsible for the coordination and control of its employees, laborers, and all trades, subcontractors, and material handlers engaged in the Work, and shall be responsible for their Work, which shall be subject to all provisions of the Contract. All subcontractors and persons or entities directly or indirectly employed by them or acting on their behalf shall be considered to be under direction and supervision of the Contractor and the Contractor shall be fully responsible for the acts and omissions of each. Nothing contained in the Contract documents shall create any contractual relationship between any subcontractor and the District. The District shall not be engaged in the settlement of any disputes between the Contractor and its subcontractors, or between subcontractors.

5-15 Incompetent or Disorderly Workers

If any subcontractor or person employed by the Contractor shall appear to the Engineer to be incompetent or to act in a disorderly or improper manner, or subcontracted work is not being prosecuted in a manner satisfactory to the District, that subcontractor or employed person shall be discharged immediately from the Project on the request of the Engineer, and that subcontractor or person shall not again be employed by the Contractor on the Project.

5-16 Final Inspection

The Engineer shall make a Final Inspection after the Work has been completed, and all deficiencies noted shall be corrected immediately and before a Final Acceptance of the Work by the District. In cases where engineering consultants provide inspection on the project, Final Inspection of the Work will be done by both the consultant and the Engineer, and all work must meet the approval of both. The Final Inspection will not be commenced by the Engineer until the Contractor has completed the requirements of Section 8-8, “Final Clean-up”.

Where facilities have been constructed by the Contractor for other agencies, or where facilities owned, operated, or maintained by other agencies or private utilities that were affected by the Work have been repaired or restored, a Final Inspection of the facilities may be made by representatives of those agencies or utilities. The Contractor shall comply with the requirements of said representatives.

Reference is made to Section 8-15, “Acceptance of Contract”, and Section 9-10, “Final Payment”, for actions following successful completion of the Final Inspection. Reference is made to Section 31, “Landscape Planting” for special maintenance which must be provided before a Final Inspection is made.

SECTION 6 - CONTROL OF MATERIALS

6-1 Testing of Materials and Work

Except as provided in Section 6-3, "Samples and Tests", for initial soils compaction tests, the cost of all other tests of materials or Work prescribed in the Plans, these Specifications and the Special Provisions shall be considered as having been included in the prices bid for the various contract items of work, and no additional payment will be made therefor.

The Contractor shall comply with the requirements of Section 5-11, "Inspection During Construction", in providing access to the Work for testing personnel and equipment. Materials or Work to be tested during construction may include, but not be limited to, soil compaction tests and concrete sampling for compressive strength tests.

6-2 Supply and Quality of Materials

The Contractor shall furnish all materials required to complete the Work, except materials that are designated in the Special Provisions to be furnished by the District. Notwithstanding any prior inspection or approval, only materials conforming to the requirements of the Plans, these Specifications and the Special Provisions shall be incorporated in the Work.

The materials furnished and used shall be new, except as may specifically be provided on the Plans or in the Special Provisions. The materials shall be manufactured, handled and used in a workmanlike manner to insure completed Work in accordance with the Contract Documents.

6-3 Samples and Tests

At the option of the Engineer, the source of supply of each of the materials shall be approved by the Engineer before delivery is started or before such material is used in the Work. Representative preliminary samples of all materials to be used in the Work of the prescribed character and quality shall be submitted by the Contractor or producer for testing or examination as desired by the Engineer. The Contractor shall furnish any tests required and certificates for the tests at its expense except as otherwise provided in this Section 6-3, or unless otherwise specified in the Special Provisions.

The Contractor shall furnish such samples of materials as requested by the Engineer without charge. No material shall be used until it has been approved by the Engineer. Samples will be secured and tested whenever necessary to determine the quality of materials.

All tests shall be made in accordance with the commonly recognized standards of national organizations and such special methods or tests as are prescribed in these Specifications or the Special Provisions. Testing of materials or Work shall be done by such laboratories as are authorized by the Engineer.

Initial testing of compaction of soil backfill or embankment construction shall be provided by the District at its expense unless otherwise provided in the Special Provisions. The Contractor shall give adequate notice to the Engineer when tests are desired. All retesting of backfill or embankment compaction required because of failure to pass initial tests shall be at the expense of

the Contractor. Costs for retests will be calculated based on the rates provided by the soils testing laboratory. The testing laboratory will bill the Contractor directly for retests.

Reference is made to Section 19-13, "Concrete Tests". Testing of concrete used for Cast-in-Place Concrete Pipe or concrete structures shall be at the Contractor's expense, including initial tests and any retests. The Contractor will be billed directly for the costs of the tests from the testing laboratory authorized by the Engineer and shall pay all costs directly to the laboratory.

An overtime testing charge shall be paid by the Contractor when soils compaction and/or concrete tests are requested or required to be performed during other than the normal daily eight (8) hours or on Saturdays, Sundays, or District holidays. Said charge shall be calculated at the rates provided by the testing laboratory. Costs for overtime initial compaction tests will be deducted by the District from monies owed the Contractor as provided by Section 9-9, "Stop Notices; District's Right to Withhold Payments", or the Contractor may pay the amount directly to the District. Costs for overtime retests of compaction shall be paid by the Contractor directly to the testing laboratory. Costs for overtime concrete tests or retests shall be paid by the Contractor directly to the laboratory.

6-4 Storage of Materials

Articles or materials to be incorporated into the Work shall be stored in such a manner as to ensure the preservation of their quality and fitness for the Work, and to facilitate inspection. It shall be the Contractor's responsibility to replace at no cost to the District any materials damaged or stolen while in storage. The Contractor shall, at its own expense, procure any temporary easements required for such storage. Storage on the job site shall be approved in advance by the Engineer, and shall be done only in a manner which will not create traffic or public safety hazards or access difficulty. Reference is made to Section 7-24, "Public Convenience and Safety". Storage of Materials shall also comply with the requirements of Section 7-29, "Water Pollution Prevention".

6-5 Certificates of Compliance

At no cost to the District, a Certificate of Compliance stating that the materials to be used or are being used in the Work comply in all respects with the requirements of the Plans, these Specifications and the Special Provisions, and shall be supplied by the Contractor to the Engineer upon request. The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer. The Certificate shall be signed by the manufacturer or supplier of the material or the manufacturer of assembled material to be delivered to the Work, and the lot so certified must be clearly identified in the Certificate.

All materials used in the Work pursuant to a Certificate of Compliance may be tested and sampled at any time by the Engineer. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Plans, these Specifications, or the Special Provisions, and any such material not conforming to such requirements will be subject to rejection whether or not in place.

The District reserves the right to refuse to permit the use of material on the Work even if a Certificate of Compliance is provided therefor to the District.

6-6 Brand or Trade Name Materials

Whenever in the Plans, these Specifications, or the Special Provisions, a brand, trade or manufacturer's name "or equal" is used to describe a material or article to be furnished, it shall be understood that the use of the brand or trade name is intended to describe a standard of quality for the material to be used on the Project. In such case, the District's intention shall not be interpreted to exclude or omit the products of any responsible manufacturer if such products are equal or superior in every respect to those specifically described.

The successful bidder shall have a period of twenty-one (21) days after award of the Contract within which to submit a written request for substitution of any material, accompanied by complete data substantiating the substitution as an "equal" item. No substitutions shall be used in the Work until the Engineer has determined the acceptability of the requested substitution, which may include such samples and tests as may be required by Section 6-3, "Samples and Tests", of these Specifications. The Engineer shall be the sole judge as to the quality and suitability of the alternative material, and the Engineer's decision shall be final. No time extension to the Contract shall be allowed due to any such proposed substitution or the time required to determine the acceptability of such substitutions.

If the term "or equal" is not stated in the Plans, these Specifications, or the Special Provisions, whether for reasons of compatibility with other District equipment or facilities, stockage of materials, maintenance, employee training, or otherwise, the brand, trade name, or manufacturer must be provided without substitution.

6-7 Foreign Materials

Materials which are manufactured, produced, or fabricated outside of the United States shall be delivered to a distribution point in California unless otherwise required in the Contract Documents, where they shall be retained for a sufficient period of time to permit inspection, sampling, and testing.

The Contractor shall not be entitled to an extension of time for acts or events occurring outside of the United States, and it shall be the Contractor's responsibility to deliver materials obtained from outside of the United States to the point of entry into the continental United States in sufficient time to permit timely deliver to the job site.

The Contractor, at no cost to the District, shall supply the facilities and arrange for any testing required in California which the State is not equipped to perform. All testing by the Contractor shall be subject to witnessing by the Engineer.

The manufacturer, producer, or fabricator of foreign material shall furnish to the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-5, "Certificates of Compliance". In addition, certified mill test reports clearly identifiable to the lot of material shall be furnished where required in these Specifications, the Special Provisions, or otherwise requested by the Engineer.

If the welding of steel for structural steel members or the casting and pre-stressing of pre-cast pre-stressed concrete members is to be performed outside of the United States, the following requirements shall apply:

1. The fabrication shall be performed only within the plants and by fabricators who have previously established, to the satisfaction of the Engineer, that they have the experience, knowledge, trained manpower, quality controls, equipment and other facilities required to produce the quality and quantity of work required. At the option of the Engineer, prequalification of the plant and fabricator will be established either by the submission of detailed written proof thereof or through in-plant inspection by the Engineer or the Engineer's representative, or both, at the Contractor's expense.
2. The Contractor shall make written application to the Engineer for the approval for the foreign fabrication at the earliest possible time, and in no case later than fifty (50) days in advance of the planned start of fabrication. The application shall list the specific units or portion of a work which will be fabricated outside of the United States.
3. The Contractor shall advise the Engineer, in writing, at least twenty (20) days in advance of the actual start of any of the foreign fabrication.
4. All documents pertaining to the Contract, including but not limited to, correspondence, bid documents, working drawings and data shall be written in the English language and all numerical data shall use the U.S. Customary units of measurement.

The use of steel manufactured outside of the United States as unidentified stock material will not be allowed.

6-8 Defective Material

All materials which the Engineer has determined do not conform to the requirements of the Contract Documents shall be considered as defective, and all such materials, whether or not in place, shall be rejected and shall be removed immediately from the site of the Work and disposed of in accordance with Section 7-31, "Disposal of Material", unless otherwise approved in writing by the Engineer in his sole and absolute discretion. No rejected material, the defects of which have subsequently been corrected, shall be used in the Work until approved by the Engineer.

If the Contractor fails to comply with any order of the Engineer made under the provisions of this Section 6-8, the Engineer shall have authority to remove and replace defective material and to deduct the cost of removal and replacement from any monies due or to become due to the Contractor, or to receive immediate reimbursement of such cost from the Contractor.

6-9 Guarantee of Materials and Workmanship

The Contractor shall guarantee all materials, equipment and workmanship of the installation for a period of not less than one (1) year from the date of the filing of the Notice of Completion, or for such other period as set forth by law. Should any material, appliance, or portion of the Work develop any defect or weakness due, in the opinion of the Engineer, to the use of imperfect materials, equipment or workmanship, or failure to follow the Contract Documents, the Contractor shall be notified and it shall immediately, at its own expense, make the necessary repairs or replacements to make the defective item or items satisfactory to the Engineer in accordance with the Contract Documents. Should a threat to the public health or safety, or to public or private property necessitate the repairs before the Contractor could be notified, or should the Contractor fail or refuse to make the repairs or replacements within a reasonable period of time, the District shall have the right to make the necessary repairs or replacements at the expense of the Contractor.

This guarantee is not intended to include the damage by the actions of individuals other than the Contractor's forces, or by damages due to the activities of other Contractors working in the area, either during the time this Work is under construction or after its acceptance. Attention is directed to Sections 7-11, "District Responsibility for Damage", and 7-14, "Contractor's Responsibility for Work and Materials".

Manufacturers' warranties and guaranties shall be issued in the name of the District, or shall be assigned to the District, and shall, along with all instruction sheets and parts lists which are furnished with certain articles or materials incorporated into the Work, be delivered to the Engineer before acceptance of the Contract. The fact that manufacturer's warranties and guarantees exist shall not relieve the Contractor of the responsibility to guarantee all materials and equipment furnished in the Work for such period as specified herein.

6-10 Salvage of Materials

Unless otherwise indicated on the Plans, specified in the Special Provisions, or directed by the Engineer, salvageable material shall remain the property of the District and shall be delivered and deposited by the Contractor at the location specified by the Engineer. No separate payment will be made for such salvaging and delivering of material, and the cost thereof shall be included in the various bid items of Work, unless otherwise indicated in the Special Provisions.

All other material not salvaged shall be removed and disposed of by the Contractor in accordance with Section 7-31, "Disposal of Material".

SECTION 7 - LEGAL RELATIONS AND RESPONSIBILITIES

7-1 Compliance with Laws and Regulations

The Contractor shall keep fully informed of, and ensure compliance therewith by itself, its employees, agents, and subcontractors, all existing and future State and Federal laws, and County and City ordinances and regulations which in any manner affect those engaged or employed in the Work, or the materials used in the Work, or which in any way affect the conduct of the Work, and of all such orders and decrees of bodies or tribunals having competent jurisdiction or authority over the same, and shall defend, indemnify, and hold the District, its directors, officers, employees, authorized volunteers, agents and consultants, and each of them harmless against any claim or liability arising from or based on any alleged violation of the same. If any discrepancy, inconsistency or illegality is discovered in the Contract Documents in relation to any such law, ordinance, regulation, order or decree, the Contractor shall forthwith report the same to the Engineer in writing.

7-2 Modification, Amendment, or Termination of Contract

Reference is made to Section 8-14, "Termination of Contract". The District may terminate, amend or modify the Contract as determined by the Engineer to prevent violation of any applicable law or regulation. In the event of such termination, modification or amendment, the notification to the Contractor thereof will include a statement of the compensation payable, if any, by reason of such termination, modification or amendment for the actual Work performed to the satisfaction of the Engineer. The provisions of Section 9-6, "Notice of Potential Claim", Section 9-10, "Final Payment", and Section 9-11, "Claims", of these Specifications shall apply to the filing and determination of any claim or claims of the Contractor in connection with such termination, modification or amendment. In the event of termination, the thirty-day (30) period therein referred to shall commence to run from the date of the notification of termination.

7-3 Security of Employee Compensation

The Contractor shall secure the payment of compensation to its employees in accordance with the provisions of Section 3700 of the Labor Code and Section 7-13.01, "Workers' Compensation and Employer's Liability Insurance", of these Specifications.

7-4 Hours of Labor

Eight (8) hours labor constitutes a legal day's work, as provided in Labor Code Sections 1810 to 1814, with which the Contractor and any subcontractors shall comply. Subject to the exception provided in Section 1815 of said Code, the Contractor shall forfeit as penalty to the District the sum of Twenty-five (25) Dollars (or such other sum as may be imposed by future statute) for each worker employed in the execution of the Contract by it or by any subcontractor under it for each calendar day during which any worker is required or permitted to labor more than eight (8) hours in any one (1) calendar day and forty (40) hours in any one (1) calendar week. The foregoing notwithstanding, Work performed by employees of the Contractor or subcontractors in excess of eight (8) hours per day, and forty (40) hours during any one (1) week, shall be permitted upon compensation for all hours at not less than one and one half (1½) times the basic rate of pay as provided in said Section 1815. Reference is made to Section 7-33, "Sound Control Requirements", regarding hours of the day during which the Work may be performed.

7-5 Labor Nondiscrimination

No discrimination shall be made in the employment of persons upon public works because of race, religion, creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status or sex of such persons, subject to the exceptions set forth in Government Code Section 12940. Every Contractor or subcontractor violating this Section is subject to all the penalties imposed for a violation of Chapter 1 of Part VII of Division 2 of the Labor Code, in accordance with the provisions of Section 1735 of said Code.

7-6 Travel and Subsistence

The Contractor, and each of its subcontractors, shall pay travel and subsistence payments to each worker needed to execute the Work, as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Section 1773.8 of the Labor Code.

7-7 Prevailing Wage; Payroll

The Contractor and all subcontractors shall inform themselves of, and shall comply with, all applicable laws and regulations governing the payment of prevailing wages, including, without limitation, Labor Code Sections 1774 and 1775.

The Contractor and all subcontractors shall forfeit to the District as penalty of not more than Fifty (50) dollars, or such other amount as may be amended by the State Department of Industrial Relations from time to time, for each calendar day or portion thereof for each workman paid less than the stipulated prevailing rates for any Work done under the Contract by it or by any subcontractor under it in violation of the provisions of the Labor Code, including Section 1775. The actual amount of the penalty shall be determined by the State Labor Commissioner.

The District will not recognize any claim for additional compensation because of any increase in the prevailing wage rate. The possibility of wage increases is one of the elements to be considered by the Contractor in determining its bid, and will not under any circumstances be considered as the basis of a claim against the District.

In accordance with the provisions of the Labor Code, the District has on file at its office a schedule of prevailing wage rates for the types of Work to be done under the Contract, and copies may be obtained at said office. General prevailing wage rates are also available from the California Department of Industrial Relations Internet Web Site at: <http://www.dir.ca.gov>.

Pursuant to Section 1773.2 of the Labor Code, general prevailing wage rates shall be posted by the Contractor at the site of the Work.

The Contractor and any subcontractor shall keep and maintain accurate payroll records in compliance with Labor Code Section 1776, and Sections 16016 through 16019 and Sections 16207.10 through 16207.19 of Title 8, California Code of Regulations. If specified in the Special Provisions, or if requested by the Engineer, certified copies of payrolls shall be submitted within ten (10) calendar days following the close of the normal pay period or periods.

7-8 Employment of Apprentices

The Contractor and all subcontractors shall comply with the provisions of Sections 1777.5, 1777.6 and 1777.7 of the California Labor Code and Title 8, Section 200 et seq., of the California Code of Regulations. To ensure compliance and complete understanding of the law regarding apprentices, and specifically the required ratio thereunder, each Contractor or subcontractor should, where some questions exists, contact the Division of Apprenticeship Standards, 455 Golden Gate Avenue, San Francisco, CA 94102, or one of its branch offices prior to commencement of Work on the public works contract. Responsibility for compliance with this Section 7-8 lies with the Contractor.

7-9 Contractor's Licensing Laws

The Contractor and all subcontractors shall be licensed in accordance with the applicable provisions of Division 3, Chapter 9, of the Business & Professions Code of the State of California. Reference is made to Section 3-1, "Award of Contract". No contract will be awarded to a Contractor who is not so licensed, or does not possess the classification(s) as specified in the Notice to Contractors included in the Special Provisions. Subcontractors shall possess a license classification applicable to the Work being subcontracted.

7-10 Permits, Licenses, and Fees

The Contractor shall procure all necessary permits and licenses required for the conduct of the Work by these Specifications, as specified in the Special Provisions, or otherwise required by law, including, as applicable, the County of Fresno, City of Fresno, City of Clovis, Caltrans, State Division of Industrial Safety, Special Districts including the SJV Air Pollution Control District and any irrigation district, any other public jurisdictional agency, any railroad or utility company, or other private utility affected by the Work. Unless otherwise specified in the Special Provisions, the Contractor shall pay all charges and fees associated with such permits and licenses, and give all notices necessary and incidental to the due and lawful prosecution of the Work thereunder.

Satisfactory evidence of obtaining all required permits as specified in these Specifications or the Special Provisions shall be submitted to the Engineer prior to, and as a condition of, issuance of the "Notice to Proceed". The Contractor shall abide by the conditions of said permits and perform all Work governed by said permits in conformance therewith and as directed by the Engineer. In the event that the District has obtained permits, licenses or other authorizations applicable to the Work, the Contractor shall comply with the provisions of those permits, licenses and other authorizations, and as directed by the Engineer.

Should the Contractor desire to make preliminary soil investigations in public street rights-of-way, it shall secure the required permits from the appropriate Department of the Cities, County, State, or Special Districts, and abide by the provisions of said permits.

Full compensation for all costs involved in procuring all permits, licenses, and other authorizations, as indicated in these Specifications or the Special Provisions, including all fees and charges, shall be included in the amount bid for the various items of Work, and no additional payment shall be made therefor.

7-11 District Responsibility for Damage

The District, its Board, the Engineer, and their authorized agents shall not in any manner be answerable or accountable for any loss or damage that may occur to the Work or any part thereof or to any of the material or other things used or employed in finishing and completing the Work, or for any injury to any person or persons, either workmen or the public, or for damage to adjoining property from any cause which might have been prevented by the Contractor or by anyone employed by it, it being the responsibility of the Contractor to guard against all such injuries or damages to persons and property and to make good all damages from whatever cause. The Contractor shall comply with the provisions of Sections 6-9, "Guarantee of Materials and Workmanship", and 7-14, "Contractor's Responsibility for Work and Materials". Reference is also made to Section 7-15, "Responsibility of District".

7-12 Defense and Indemnification

Neither the District nor its Board, the Engineer, nor any other officer, employee, consultant, or authorized agent, shall be personally responsible for any liability arising under the Contract.

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the District, its Board, officers, employees, authorized volunteers, agents or consultants, and each of them from and against:

1. Any and all claims, demands, causes of action, damages, costs, expenses, losses or liabilities, in law or in equity, of every kind or nature whatsoever for, including but not limited to, injury to or death of any person, and damages to or destruction of property of any person or entity, arising out of or in any manner directly or indirectly connected with the Work to be performed under the Contract, however caused, regardless of any negligence of the District or its Board, officers, employees, authorized volunteers, agents or consultants, except the sole negligence or willful misconduct or active negligence of the District or its Board, officers, employees, authorized volunteers, agents or consultants;
2. Any and all actions, proceedings, damages, costs, expenses, penalties or liabilities, in law or equity, of every kind or nature whatsoever, arising out of, resulting from, or on account of the violation of any governmental law or regulation, compliance with which is the responsibility of Contractor;
3. Any and all losses, expenses, damages (including damages to the Work itself), attorneys' fees and other costs including all costs of defense, which any of them may incur with respect to the failure, neglect or refusal of Contractor to faithfully perform the Work and all of the Contractor's obligations under the Contract. Such costs, expenses, and damages shall include all costs, including attorneys' fees, incurred by the indemnified parties in any lawsuit to which they are a party.

The Contractor shall defend, at the Contractor's own costs, expense and risk, any and all such aforesaid suits, actions, or other legal proceedings of every kind that may be brought or instituted against the District or its Board, officers, employees, authorized volunteers, agents or consultants.

The Contractor's obligation to defend and indemnify shall not be excused because of the Contractor's inability to evaluate liability or because the Contractor evaluates liability and determines that the Contractor is not liable to the claimant. The Contractor will respond within thirty (30) days to the tender of any claim for defense and indemnity by the District unless this time has been extended by the District. If the Contractor fails to accept or reject a tender of defense and indemnity within thirty (30) days, in addition to any other remedy authorized by law, so much of the money due the Contractor under and by virtue of the Contract as shall reasonably be considered necessary by the District, may be retained by the District until disposition has been made of the claim or suit for damages, or until the Contractor accepts or rejects the tender of defense, whichever occurs first.

With respect to third party claims against the Contractor, the Contractor waives any and all rights of any type to express or implied indemnity against the District, its Board, officers, employees, authorized volunteers, agents, or consultants.

The Contractor shall pay and satisfy any judgment, award or decree that may be rendered against the District or its Board, officers, employees, authorized volunteers, agents or consultants, in any and all such suits, actions, or other legal proceedings.

The Contractor shall reimburse the District or its Board, officers, employees, authorized volunteers, agents or consultants, for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided.

The Contractor's obligation to indemnify shall not be restricted to insurance proceeds, if any, received by the District, or its Board, officers, employees, authorized volunteers, agents or consultants.

Nothing contained in the Contract is intended to make the public or any member thereof a third party beneficiary of the Insurance or Indemnity Provisions of these Specifications, nor is any term, condition or other provision of the Contract intended to establish a standard of care owed to the public or any member thereof.

7-13 Insurance

Insurance coverage in the minimum amounts set forth in this Section 7-13 shall not be construed to relieve the Contractor for liability in excess of such coverage, nor shall it preclude the District from taking other actions as is available to it under any other provision of the Contract or law. Failure of the District to enforce in a timely manner any of the provisions of this Section 7-13 shall not act as a waiver to enforcement of any these provisions at a later date.

7-13.01 Workers' Compensation and Employer's Liability Insurance

In compliance with Section 1861 of the Labor Code, the Contractor to whom the District awards a Contract shall sign and submit the "Workers Compensation Insurance Certification" along with other required Contract Documents. By its signature thereon, the Contractor certifies that it is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for workers' compensation or to

undertake self-insurance in accordance with the provisions of that Code, and it will comply with such provisions before commencing the performance of the Work.

The Contractor and all subcontractors shall insure (or be a qualified self-insured) under the applicable laws relating to workers' compensation insurance, all of their employees working on or about the construction site, in accordance with the "Workers' Compensation and Insurance Act", Division IV of the Labor Code of the State of California and any Acts amendatory thereof. The Contractor shall provide employer's liability insurance with limits of no less than \$1,000,000 each accident, \$1,000,000 disease policy limit, and \$1,000,000 disease each employee.

The Workers' Compensation Policy shall be endorsed to provide that the Contractor, all subcontractors, and their respective insurers shall waive all rights of subrogation against the District, its Board, officers, employees, authorized volunteers, agents or consultants.

7-13.02 Commercial General Liability and Automobile Liability Insurance

The Contractor shall provide and maintain the following occurrence based commercial general liability and automobile liability insurance:

1. Coverage:

Coverage for commercial general liability and automobile liability insurance shall be at least as broad as the following:

- a. Insurance Service Office (ISO) Commercial General Liability Coverage (Occurrence Form CG 0001).
- b. Insurance Services Office (ISO) Business Auto Coverage (Form CA 0001), covering Symbol 1 (any auto)

2. Limits:

The Contractor shall maintain limits no less than the following specified amounts. Such amounts are minimums and may be increased by the Special Provisions on a project-by-project basis.

a. General Liability:

One million dollars (\$1,000,000) per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit or products-completed operations aggregate limit is used, either the general aggregate limit shall apply separately to the project/location (with the ISO CG 2503, or ISO CG 2504, or insurer's equivalent endorsement provided to the District) or the general aggregate limit and products-completed operations aggregate limit shall be twice the required occurrence limit.

b. Automobile Liability:

One million dollars (\$1,000,000) for bodily injury and property damage each accident limit.

3. Required Provisions:

The general liability and automobile liability policies are to contain, or be endorsed to contain, the following provisions:

- a. The District, its directors, officers, employees authorized volunteers, agents or consultants are to be given insured status (via ISO endorsement CG 2010, CG 2033, or insurer's equivalent for general liability coverage) as respects: liability arising out of activities performed by or on behalf of the Contractor; products and completed operations of the Contractor; premises owned, occupied or used by the Contractor; and automobiles owned, leased, hired, borrowed, used by or on behalf of the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the District, its Board, officers, employees, authorized volunteers, agents or consultants.
- b. For any claims related to the Work, the Contractor's insurance shall be primary insurance as respects the District, its Board, officers, employees, authorized volunteers, agents or consultants. Any insurance, self-insurance, or other coverage maintained by the District, its Board, officers, employees, authorized volunteers, agents or consultants shall not contribute to it.
- c. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to the District, its Board, officers, employees, authorized volunteers, agents or consultants.
- d. The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.
- e. Each insurance policy required by the Contract shall state, or be endorsed to state, that coverage shall not be canceled by the insurance carrier or the Contractor, except after thirty (30) days (10 days for non-payment of premium) prior to written notice by U.S. mail has been given to the District.

Such liability insurance shall indemnify the Contractor and its subcontractors against loss from liability imposed by law upon, or assumed under the Contract by, the Contractor or its subcontractors for damages on account of such bodily injury (including death), property damage, personal injury, completed operations, and products liability.

The general liability policy shall cover bodily injury and property damage liability, owned and non-owned equipment, blanket contractual liability, completed operations liability, explosion, collapse, underground excavation, and removal of lateral support.

The automobile liability policy shall cover all owned, non-owned, and hired automobiles.

All of the insurance shall be provided on policy forms and through companies satisfactory to the District.

4. Deductibles and Self-Insured Retentions:

Any deductible or self-insured retention must be declared to and approved by the District. At the option of the District, the insurer shall either reduce or eliminate such deductibles or self-insured retentions.

5. Acceptability of Insurers:

Insurance is to be placed with insurers having a current A.M. Best rating of no less than A:VII or equivalent or as otherwise approved by the District. Insurers shall be listed as approved for operation in the State by the California Department of Insurance.

6. Evidences of Insurance:

Prior to award of the Contract, and within the time limits specified in Section 3-3, "Submission of Proof of Insurance", the Contractor shall file with the District a certificate of insurance (Acord Form 25-S or equivalent) signed by the insurer's representative evidencing the coverage required by these Specifications or as specified in the Special Provisions. Such evidence shall include an additional insured endorsement signed by the insurer's representative and evidence of waiver of rights of subrogation against the District. Such evidence shall also include confirmation that coverage includes or has been modified to include the provisions of Section 7-13.02(3), "Required Provisions", (a) through (e).

The Contractor shall, upon demand of the District, deliver to the District such policy or policies of insurance and the receipts for payment of premiums thereon.

7. Continuation of Coverage:

All insurance shall be kept in full force and effect from the beginning of the Work through the final acceptance by the District. In addition, the Contractor shall maintain completed operations coverage with a carrier acceptable to the District in compliance with Section 7-13.02(5), "Acceptability of Insurers", through the expiration of the patent deficiency in construction statute of repose set forth in Section 337.15 of the Code of Civil Procedure.

If any of the required coverages expire during the term of the Contract, the Contractor shall deliver the renewal certificate(s) including the general liability additional insured endorsement and evidence of waiver of rights of subrogation against the District, to the District at least ten (10) days prior to the expiration date of any coverage.

8. Waiver of Subrogation:
The Contractor shall waive all rights of subrogation against the District, its Board, officers, employees, authorized volunteers, agents, and consultants. An endorsement from the Contractor's insurance carrier effecting this waiver shall be submitted to the District with other required insurance documents.
9. Builder's Risk (Course of Construction) Insurance:
When specified by the Special Provisions, the Contractor shall provide and maintain builder's risk insurance (or installation floater) covering all risks of direct physical loss, damage or destruction to the Work in the amount specified in the Special Provisions, to insure against such losses until final acceptance of the Work by the District. Such insurance shall insure at least against the perils of fire and extended coverage, theft, vandalism and malicious mischief, and collapse. The District, its Board, officers, employees, authorized volunteers, agents, or consultants shall be named as insureds on any such policy. The making of progress payments to the Contractor shall not be construed as creating an insurable interest by or for the District or be construed as relieving the contractor or its subcontractors of responsibility for loss from any direct physical loss, damage or destruction occurring prior to final acceptance of the Work by the District.
10. Subcontractors Insurance:
In the event that the Contractor employs other contractors (subcontractors) as part of the Work covered by the Contract, it shall be the Contractor's responsibility to require and confirm that each subcontractor meets the minimum insurance requirements specified in this Section 7-13, "Insurance", or as may be otherwise specified in the Special Provisions.

Full compensation for all costs for compliance with this Section 7-13, "Insurance", shall be included in the various Contract items of Work and no additional payment will be made therefor.

7-14 Contractor's Responsibility for Work and Materials

Until the completion and final acceptance by the District of all the Work under and implied by the Contract, the Work and all materials therefor shall be under the Contractor's responsible care and charge (including Work or materials for which the Contractor has received any payment). The Contractor shall rebuild, repair, restore, and make good all injuries, damages, re-erections, and repairs to the Work or materials occasioned or rendered necessary by causes of any nature whatsoever except such injuries or damages occasioned by the negligence of the District or its Board, officers, employees, authorized volunteers, agents or consultants. Attention is directed to Sections 6-9, "Guarantee of Materials and Workmanship", and 7-11, "District Responsibility for Damage". The guarantee provisions of said Section 6-9 shall apply as specified therein.

7-15 Responsibility of District

Neither the District nor its Board, the Engineer, nor their authorized agents shall be held responsible for the care or protection of any portion of the Work or any materials used therein (including Work or materials for which the Contractor has received any payment) prior to final

acceptance, except as may be expressly provided in these Specifications. Reference is made to Section 7-11, "District Responsibility for Damage".

7-16 Sanitation Regulations

The Contractor shall comply with Paragraph 1526, Article 3, of the Construction Safety Orders as contained in Division 1, Title 8, of the California Code of Regulations. Toilet accommodations shall be maintained for the use of employees on the Work. The accommodations shall be in approved locations properly screened from public observation and shall be maintained in a strictly sanitary manner. The Contractor shall obey and enforce all State, County, and City sanitary regulations and orders, and shall take precautions against infectious diseases and the spread of same, and shall maintain at all times satisfactory sanitary conditions around all shanties, tool and supply houses and on all other parts of the Work. Necessary housing accommodations shall be provided by the Contractor for the workmen for changing clothes and for protection during inclement weather. The cost of compliance with this Section 7-16 shall be included in the various Contract items of Work and no additional payment will be made therefor.

7-17 General Worker Safety

The Contractor shall comply with Paragraph 1511, Article 3, of the Construction Safety Orders as contained in Division 1, Title 8, of the California Code of Regulations. The Contractor shall execute and maintain the Work so as to avoid injury to any of its employees or employees of subcontractors, suppliers, or other forces required to enter the Work site such as utility companies, or other persons entering the Work site including the Engineer, other District personnel or the District's duly appointed testing and surveying firms.

In carrying out the Work, the Contractor shall at all times exercise all necessary precautions for the safety of employees and others appropriate to the nature of the Work and the conditions under which the Work is to be performed. The Contractor shall comply with the provisions of the Labor Code, Division 5, "Safety in Employment", and the California Code of Regulations Title 8, Division 1, State Division of Industrial Safety Construction Safety Orders, General Industry Safety Orders, Trench Construction Safety Orders, and Tunnel Safety Orders, all other applicable laws, ordinances, and regulations, the Plans, these Specifications, and the Special Provisions. Safety precautions, as applicable, shall include but shall not be limited to: adequate worker protection and life saving equipment; adequate illumination; instructions in accident prevention for all employees, such as the use of machinery guards, safe walkways, scaffolds, ladders, bridges, gang planks, confined space procedures, trenching and shoring, fall protection, and other safety devices; equipment and wearing apparel as are necessary or lawfully required to prevent accidents, injuries, or illnesses; and adequate facilities for the proper inspection and maintenance of all safety measures.

In compliance with Labor Code Section 6708, the Contractor shall maintain adequate emergency first aid treatment for its employees sufficient to comply with Federal Occupational Safety and Health Act of 1970 (Public Law 91-596).

In compliance with Labor Code Section 6401.7, the Contractor shall have established an Injury and Illness Prevention Plan, and shall provide a copy upon request to the Engineer.

Full compensation for all costs involved in complying with these General Worker Safety provisions shall be included in the amounts bid for the various items of Work and no additional payment will be made therefore.

7-18 Worker Protection From Caving Ground in Excavations

7-18.01 General

In compliance with Article 2, Subchapter 2, Chapter 3.2, Division 1, Title 8, of the California Code of Regulations, and Section 6500 of the Labor Code, for any trenches or excavations that are five (5) feet or more in depth, the Contractor must obtain a permit from the State Division of Occupational Safety and Health. The permit may be either a Project-specific Permit, or an Annual Permit subject to the conditions specified therefor in said Article 2. The Contractor shall comply with all the permit requirements, and shall submit to the Engineer upon request evidence of the required permit.

In compliance with the provisions of Section 6705 of the Labor Code, in advance of performing excavation of any trench or trenches, jacking or receiving pits, or pump sump pits, or any other excavation five (5) feet or more in depth, the Contractor shall submit, and obtain the Engineer's approval and acceptance of, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made by the Contractor for worker protection from the hazard of caving ground during the excavation of such trenches, pits, or other excavations and during any other period that workers may be exposed to such hazard. If such plan varies from the shoring, bracing or sloping standards established by the State Division of Industrial Safety Construction Safety Orders, the plan shall be prepared and signed by a Registered Civil or Structural Engineer.

The Contractor's attention is also directed to Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading", as said Section applies to excavation.

7-18.02 Excavations Greater Than 20 Feet

In addition to the requirements of Section 7-18.01, "General", for all excavations greater than twenty (20) feet in depth, in accordance with Article 6, Subchapter 4, Chapter 4 (Construction Safety Orders), Division 1, Title 8, of the California Code of Regulations, detailed excavation plans shall be prepared and signed by a Registered Civil or Structural Engineer showing all sloping, shoring, bracing, or other protective measures to be provided for worker protection. Such plans shall be submitted to the Engineer for review and approval prior to beginning any excavation.

7-18.03 Protection for Others

The requirements as above set forth by the Labor Coder and the State Division of Industrial Safety for the provision of worker protection from the hazard of caving ground are minimum requirements. In addition, the Contractor shall provide at its expense and for the life of the Contract, the same protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person required to be exposed to such hazard in the performance of the Work, including inspection and testing of the Work, or for any other

reason. Any additional shielding, shoring, bracing, or sloping required for the protection or working room for inspection or testing of the Work shall be provided at the Contractor's expense.

7-18.04 Soils Investigations

The District makes no guarantee as to the types of soil or of soil conditions existing within the project limits. In accordance with Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract, Documents, and Site of Work", and Section 2-5, "Pre-Bid Tests", prior to submitting a bid proposal, the Contractor shall have performed any soils or other tests it deemed necessary to make itself fully aware of the soil types or conditions which may prevail throughout the project site, and the effects it may have on providing Worker Protection From Caving Ground in Excavations. Where the District has conducted soils investigations and has made such report available to prospective Bidders, the data provided therein is for the Contractor's information and convenience only. No representation is made as to the type of, or difficulty in providing, Worker Protection From Caving Ground in Excavations.

No payment will be made for additional or different Worker Protection From Caving Ground due to soil conditions differing from those anticipated by the Contractor.

7-18.05 Payment

Payment for Worker Protection From Caving Ground in Excavations during construction shall be made at the lump sum bid price, and no additional payment will be made therefor. Payment shall include all materials, labor and equipment necessary to obtain the necessary permits and adequately brace, shore, shield or slope all excavations and trenches as required by Labor Code Sections 6500 and 6705, and California Code of Regulations Title 8; also to be included are any costs incurred by the Contractor in preparing, or having prepared and signed by a Registered Civil or Structural Engineer where required, detailed plans showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of trenches or other work requiring excavation, and any other costs incurred in providing for worker and public safety.

7-19 Worker Protection From Toxic Or Explosive Gases; Confined Spaces Entry

In compliance with the provisions of the Labor Code and the California Code of Regulations as set forth in Section 7-17, "General Worker Safety", the Contractor shall protect workers from toxic or explosive gases by providing whatever testing equipment and other special equipment that may be needed to detect the presence of and to remove such toxic or explosive gases found or suspected to exist in any above or below ground facilities (whether newly constructed or existing), excavations, or other activities involved in the Work. Detection and removal shall be accomplished by methods which comply with the regulations governing such detection and removal. The Engineer and the Fire Department of the local jurisdictional agency should be notified immediately after detection.

The Contractor shall also comply with the provisions of the California Code of Regulations Title 8, Division 1, Chapter 4, Subchapter 7, General Industry Safety Orders, Group 16, Article 108, "Confined Spaces", whenever the Contractor or any of its employees must enter a confined space, as defined in said Safety Orders, whether the confined space is new or existing.

The above requirements are minimum requirements. In addition, the Contractor shall provide for the life of the Contract similar protection for any person, including the Engineer or any of his authorized representatives, subcontractors, or any other person authorized or required to enter such underground facilities for inspection, repairs, or any other reason.

If the presence of toxic or explosive gases is due to the actions of the Contractor, all costs for worker protection, detection, removal, or repairs are to be borne by the Contractor. If the presence of toxic or explosive gases is the result of latent or other conditions outside the control of the Contractor, compensation, if any, will be determined by the Engineer after submittal in writing of detailed costs the Contractor believes it incurred due to such presence. In the event of a dispute, nothing in this Section 7-19 shall free the Contractor of the responsibility to immediately take the necessary actions to provide worker protection and to remove or repair the cause of the presence of toxic or explosive gases.

All costs for providing Worker Protection from Toxic or Explosive Gases; Confined Spaces Entry", shall be included in the various bid items of Work and no additional payment will be made therefor.

7-20 Trenches and Excavations - Hazardous Waste

The Contractor shall comply with the provisions of Section 7104 of the Public Contract Code as it applies to encountering material the Contractor believes may be hazardous waste during the performance of any excavation of trenches, jacking or receiving pits, pump sump pits, or any other excavation. The Contractor shall promptly, and before such materials are significantly disturbed, notify the Engineer, in writing, of any material that the Contractor believes may be hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

The Engineer shall promptly investigate the material and if it is determined to be hazardous as above provided, make appropriate arrangements for the proper removal and disposal by forces qualified for such work. The Contractor shall cooperate with such forces to accomplish removal in the most expeditious manner. Any claims by the Contractor for additional compensation or time due to such operations shall be submitted in detail and in writing to the Engineer for consideration.

7-21 Protection of Archeological, Cultural, Paleontological Resources

In the performance of the Work, the Contractor may encounter artifacts of an archeological, cultural, or paleontological nature. These discoveries may include, but not be limited to, remains of Native American cultures, European or South American settlements, prehistoric animals, memorials to individuals, human remains, or other materials relating to historical events or early life forms. As specified in Section 5097.5 of the State Public Resources Code and Section

7050.5 of the State Health and Safety Code, it is against the law to willfully remove, destroy, injure, or deface any such artifact. Before commencing Work under the Contract, the Contractor shall instruct its personnel on the law as enumerated in said State Codes, and to be alert to the possibility of the presence of artifacts in areas to be excavated.

Upon encountering an artifact, even if it is questionable in the Contractor's opinion that the object is in fact an artifact as above defined, the Contractor shall immediately stop Work on the activity leading to the exposure of the artifact(s), contact and inform the Engineer of the discovery, and take appropriate measures to protect the artifact(s) until the arrival of the Engineer. The Engineer will make a preliminary evaluation and determine the need to contact appropriately-trained personnel for further evaluation. If human remains are found, the Engineer will immediately contact the Fresno County Coroner's Office for an evaluation. State Public Resources Code Section 5097.98 shall be adhered to in the case of remains identified as Native American.

The Contractor shall not proceed with the designated affected Work until given express approval to do so by the Engineer. All other Work shall proceed uninterrupted. Any claim for additional compensation or contract time due to a delay in the Work shall be substantiated in writing and in sufficient detail to allow the Engineer to make a determination of equitable compensation amounts and/or additional contract time, if any.

7-22 Protection of Underground Utilities

The Contractor shall be responsible for the safeguarding and protection of all utilities, as said term is defined in Section 1-42, "Utility". The Contractor shall comply with all of the requirements of Section 10, "Underground Utilities", and the Construction Safety Orders contained in the California Code of Regulations, Title 8, Division 1, as said Orders relate to the protection of underground utilities.

7-23 Protection and Restoration of Existing Improvements

Due care shall be exercised by the Contractor to avoid injury or damage to any existing public or private improvements such as, but not limited to, lawn, trees, shrubs, hedges, fences, mail boxes, signs, survey markers and monuments, poles, sprinkler systems, walls, buildings and structures, conduits, pipelines under and above ground, sidewalks, driveways, curb and gutter, pavement and any other improvements or facilities within or adjacent to the Work area, whether on public right of way or private property adjacent to the Work area. The Contractor shall also comply with Section 10, "Underground Utilities", for protection of existing utilities, Section 16-4, "Miscellaneous Surface Restoration", for restoration of other damaged surface improvements not included in this Section 7-23, and Section 16-5, "Traffic Markings Replacement", for restoration of all forms of damaged traffic markings.

Replacement and restoration of said improvements shall be to a condition at least as good as when the Contractor entered the Work area, shall meet the approval of the Engineer and shall be made immediately upon notification by the Engineer. At locations where structures are constructed behind curb lines and/or within landscaped areas, all external structure patching, final back filling, final sprinkler system repairing and lawn reseeding and mulching behind the

curb line shall be completed within fifteen (15) calendar days of beginning of excavation for the structure.

Irrigation and sprinkler system lines behind the curb disturbed by construction shall be repaired as follows:

1. Sprinkler or irrigation lines and facilities disturbed by structure construction shall immediately be temporarily capped.
2. Sprinkler or irrigation lines and facilities disturbed shall be replaced to original condition using material similar to or better than that removed, e.g., galvanized pipe to be replaced with galvanized pipe, brand name heads replaced with same brand name and model, unless otherwise approved by the Engineer. Sprinkler lines shall be realigned around structures in order to duplicate original irrigation coverage.
3. Sprinkler systems disturbed and repaired shall be water-tested by the Contractor in the presence of the Engineer before acceptance of the repair.

All costs involved in the protection, restoration and replacement of existing improvements shall be considered as being included in the bid prices of the various items of Work, and no additional payment shall be made therefor, unless otherwise specified in the Special Provisions.

7-24 Public Convenience and Safety

It is the Contractor's responsibility to provide traffic and public safety through the Work area at all times for the life of the Contract. The Contractor shall so conduct its operations as to offer the least possible obstruction and inconvenience to the public and abutting property owners. The Contractor's Work area, and the duration of the Contractor's Work, shall be limited in such manner as may be practicable to minimize the impact upon the rights and convenience of the public. Unless other existing roads or streets are specified in the Special Provisions to be used as detours, all traffic shall be permitted to pass through the Work with minimal inconvenience and delay.

Residents along the road or street affected by the Work shall be provided vehicular access to their residences as much and as soon as practicable, or when directed by the Engineer. Unless otherwise provided in the Special Provisions, access to driveways, houses, and other buildings along the line of Work shall be maintained, and temporary approaches to crossings shall be provided and kept in good condition. Pedestrian access to all properties along the line of Work shall be provided at all times. Closure of any crossing or intersecting streets or roads shall only be with the approval of the Engineer and the traffic authority of the governmental entity having jurisdiction.

Whenever the Contractor's operations create a condition hazardous to traffic or to the public, the Contractor shall, at the Contractor's expense and without cost to the District, furnish, erect and maintain those fences, temporary railing (Type K), barricades, earthen berms, lights, signs and other devices and shall take such other protective measures that are necessary to prevent accidents or damage or injury to the public. Fences, temporary railing (Type K), barricades,

earthen berms, lights, signs, and other devices furnished, erected and maintained by the Contractor, at the Contractor's expense, are in addition to any construction area traffic control devices for which payment is provided for elsewhere in these Specifications.

The Contractor shall be required to provide competent flaggers, guards, and signage as required by Section 7-25, "Traffic Control", or as determined by the Engineer, to direct and control the movement of traffic through or around the Work. Control of dust shall be provided as specified in Section 7-26, "Dust Control".

All labor, equipment, materials, or any incidentals necessary in providing for Public Convenience and Safety, as above specified, shall be included in the prices bid for the various items of Work, and no additional payment shall be made therefor.

7-25 Traffic Control

The Contractor shall execute the Work so as to minimize interference with the free passage of traffic. The Contractor shall provide and maintain, at its own expense, the necessary signs, lights, changeable message signs, flares, temporary railing (Type K), barricades with flashing lights, earthen berms, flaggers, and other facilities necessary to safely direct traffic through and around the Work, and shall take such other protective measures as may be necessary to prevent accidents, damage or injury to the public, or to protect the Work from damage.

As required by the Construction Safety Orders contained in the California Code of Regulations, Division 1, Title 8, and in compliance with Section 7-24 "Public Convenience and Safety", traffic control shall be furnished and maintained by the Contractor in conformance with the California Manual on Uniform Traffic Control Devices for Streets and Highways (California MUTCD) latest edition. The Contractor shall prepare a detailed Traffic Control Plan conforming to the California MUTCD and submit it to the Engineer and the agency having jurisdiction over the public right of way at the pre-construction conference, or other time if specified by the Engineer or the Special Provisions. After review of the Plan by the Engineer and the jurisdictional agency, the Contractor shall revise the Plan as required and resubmit same to the agency and Engineer. In preparing the Plan, the Contractor shall comply with all of the requirements of the California MUTCD including, without limitation, the size, shape, and color of signage. Compliance with said requirements shall be considered as a minimum requirement, and it shall be the responsibility of the Contractor to provide additional safety devices when necessary to maintain a safe condition.

All traffic and detour patterns indicated in the Special Provisions or as specified in the permit issued for the Work by the governmental agency having jurisdiction over the Work area public rights of way shall be incorporated into the foregoing Traffic Control Plan. After implementation of the Plan, any deviations proposed by the Contractor require the prior written approval of the Engineer and said governmental agency.

Prior to closing a street pursuant to authorization from the traffic department of the governmental agency having jurisdiction, the Contractor shall provide written notice to said traffic department so it may provide notice to entities providing police, fire, refuse collection, or ambulance service to that area. The Contractor may be required by the agency to provide such notices. The

Contractor shall make passage through the area of the Work available to all emergency service vehicles at all times.

It shall be the Contractor's sole responsibility to provide and maintain adequate traffic safety devices and warning signs in compliance with the approved Traffic Control Plan. If, however, the Engineer or an Inspector of the jurisdictional City, the County or Caltrans Traffic Departments notes some deficiency in said devices, the situation shall be corrected immediately by the Contractor.

Full compensation for all costs involved in providing and maintaining Traffic Control in the vicinity of and through the Work site in accordance with the requirements specified herein, the Special Provisions, in the approved Traffic Control Plan, and any special requirements set forth in the permit issued by the jurisdictional agency, shall be included in the lump sum price bid for Traffic Control. Where no bid item is provided for Traffic Control, the cost therefor shall be included in the various Contract items of Work, and no additional payment shall be made therefor.

7-26 Dust Control

The Contractor shall maintain dust control on and about the site of the Work, including trenching activities, retention basin excavation, any haul roads to or from the site, or any other work required by the Contract which creates dust, by whatever means are necessary such as watering, sweeping or applying an approved dust palliative, so as to cause the least possible nuisance by dust to the public in compliance with applicable laws and ordinances. Any dust control measure ordered by the Engineer shall be immediately carried out. Dust Control measures shall be fully and adequately carried out on weekdays, weekends, and holidays, and when necessary, before or after normal working hours. When specified by the Special Provisions or required by the San Joaquin Valley Air Pollution Control District (SJVAPCD), the Contractor shall submit a Dust Control Plan to the Engineer at the pre-construction conference. Such plan shall be approved by the Engineer prior to commencing any construction activity.

The Contractor shall comply with the requirements of Section 7-10, "Permits, Licenses, and Fees", and Section 7-32, "Electrical and Water Service". A permit is required by the jurisdictional agency to obtain water from its water system for use in Dust Control or any other construction activities. This includes Irrigation Districts or other agencies furnishing non-potable water for such purposes. It shall be the Contractor's responsibility to procure the water source and any required permit, and pay all fees and charges associated therewith.

As above provided, the Contractor shall comply with all applicable laws, regulations and ordinances including, but not limited to, the SJVAPCD Regulation VIII, Fugitive PM10 Prohibitions, Rules 8011, 8021, 8031, 8041, 8061, and 8071, regarding fugitive dust requirements for control of fine particulate matter (PM10) from construction, demolition, excavation, and extraction activities. If a violation of any applicable law, regulation or ordinance does occur, the Contractor shall pay all fines or penalties associated therewith, including, but not limited to, a civil penalty pursuant to State Health and Safety Code Section 42402 of up to one thousand (1,000) dollars for each day of violation of any rule, regulation, permit, or order of the SJVAPCD.

The Engineer may specify, whenever conditions warrant, the intervals at which interim cleaning and sweeping of roadways or other areas of the Work shall occur. Such cleaning and sweeping shall include haul routes or connecting roadways on which dirt, mud, or other debris has been tracked by the Contractor's operations or cross traffic. Spillage resulting from hauling operations along or across any way traveled by the public shall be removed immediately by the Contractor at its expense. Immediately following completion of hauling, all haul routes and affected connecting roadways shall be swept and cleaned to the satisfaction of the Engineer.

If the Contractor fails to provide dust control measures ordered by the Engineer within a one-half (½) hour time period after being so ordered, or as otherwise determined by the Engineer, in addition to any fines or penalties imposed by any other governmental agency on the Contractor, and/or the District, the Contractor shall pay to the District a penalty of twenty five (25) dollars for each one-half (½) hour, or portion thereof, that elapses from the time the penalty is ordered into effect by the Engineer until dust control measures ordered by the Engineer are completely carried out and the dust nuisance eliminated and prevented from reoccurring. Such penalty shall be deducted from any monies owed the Contractor, or shall be paid directly to the District by the Contractor.

If the measures so required are not completed within a reasonable time established by the Engineer, the Engineer may immediately suspend all Work and order Dust Control measures be done by others, with the cost thereof deducted from any monies owed the Contractor, or the cost thereof paid directly to the District by the Contractor. The suspension and the application of said penalty will be lifted only upon re-institution of adequate Dust Control measures by the Contractor. No time extension to the Contract will be permitted for any suspension ordered by the Engineer as herein provided.

Full compensation for Dust Control, including preparation and submittal of a plan if so specified or required, shall be included in the lump sum amount bid therefor. Where no bid item is provided for Dust Control, the cost thereof shall be included in the amount bid for the various Contract items of Work and no additional payment shall be made therefor, unless otherwise specified in the Special Provisions.

7-27 Air Pollution, Contractor's Equipment

In addition to the air pollution requirements of Section 7-26, "Dust Control", the Contractor shall comply with all State and Federal statutes, laws and regulations as they apply to air pollution in the conduct of all aspects of the Work. This includes the use of paints, chemicals, or any materials covered by such statutes, laws and regulations.

In addition, the Contractor shall provide and use only adequate, suitable, properly-maintained equipment meeting all the requirements (including air pollution control) of said State and Federal statutes, laws, and regulations, and means of construction to meet all the requirements of the Work in compliance with applicable environmental laws. When ordered to do so by the Engineer, the Contractor shall remove unsuitable equipment from the Work and discontinue the operation of unsatisfactory equipment. The use of any equipment or other means of construction which does not comply with air pollution statutes, laws or regulations, is obsolete as to type, in

bad condition, or worn out, shall not be permitted on the Work site. The Contractor shall, at its expense, provide off-street storage for equipment not used for that day's Work.

7-28 Maintaining Drainage

Reference is made to Section 14-5, "Maintaining Drainage, Trench and Structure Excavation", Section 14-6 "Maintaining Drainage, Retention Basin Excavation", and Section 15-9, "Maintaining Drainage, Retention Basin Embankment Construction". In addition to the requirements therein, the Contractor shall also provide and maintain drainage to the existing street sections within the area of the Work. This includes drainage of storm water as well as non-storm water related flows such as seasonal excess landscape irrigation flow, swimming pool draining, or discharge of irrigation tail-water where agricultural land may exist adjacent to the area of the Work.

During and following storm conditions, or when excess non-storm water related flows are present, the Contractor shall provide for temporary use for drainage purposes of completed or partially completed drainage facilities. Temporary provisions for drainage of any area during construction where existing facilities have been damaged or altered by the Contractor during its operations shall be made by the Contractor as directed by the Engineer. The Contractor shall dewater existing and newly constructed storm drain pipelines as necessary and maintain such systems in functional order during the life of the Contract. Any methods employed by the Contractor shall not adversely impact upstream or downstream drainage, and shall be approved by the Engineer in writing in advance. Work being conducted within a storm drainage retention basin shall not preclude its use for disposal or storage of storm or other runoff entering the site from drainage facilities. Insofar as practical, the Contractor shall make provisions to keep such runoff out of the work area in the basin to allow Work to proceed. Any such redirection of flows, or use of temporary plugs in incoming pipelines or channels, shall be approved in advance by the Engineer.

The Contractor shall be responsible for all damage to public or private property caused by failure to provide adequate drainage within and through the construction area, or blockage of existing drainage facilities at or upstream from the area of Work in excess of the capacity of the existing upstream drainage facilities.

No separate compensation shall be made for providing or maintaining drainage, and full payment therefor shall be included in the prices bid for the various items of Work.

7-29 Water Pollution Prevention

For all Contracts, the Contractor shall comply with District Ordinance 96-1, "Urban Storm Water Quality Management and Discharge Control", hereinafter "District Ordinance 96-1". The Contractor shall also comply with the requirements of the "Fresno-Clovis Storm Water Quality Management Program Construction Site Storm Water Quality Management Guidelines" dated August 1994 and any revisions thereto, hereinafter "Guidelines". The Contractor shall exercise every reasonable precaution and shall conduct and schedule operations so as to protect all storm drain systems, storm water retention/detention basins, irrigation canals, or natural streams located within, adjacent to, or in any way connected with, the Project from pollution with mud,

silt, fuels, oils, bitumens, calcium chloride, pesticides, herbicides, and any other harmful materials, whether emanating from storm runoff or non-storm water discharge.

Unless otherwise specified in the Special Provisions, for Projects less than 1 acre, as determined by the District prior to advertising for bids for the Work, Water Pollution Prevention shall be provided in accordance with, and as required by, said District Ordinance 96-1 and said Guidelines. The cost thereof shall be included in the bid item provided therefor. If no bid item is provided, the cost for providing Water Pollution Prevention shall be included in the various contract bid items of Work; no additional payment will be made therefor.

For Projects one (1) acre or greater in size, as determined by the District prior to advertising for bids for the Work, the District will determine if the project is eligible for a State General Permit Erosivity Waiver, and make application to the State Water Resources Control Board for said waiver. For projects granted a waiver, any waiver conditions and the waiver expiration date will be included in the Special Provisions. The Contractor shall comply with any waiver conditions, said District Ordinance 96-1 and said Guidelines. The cost thereof shall be included in the bid item provided therefor. If no bid item is provided, the cost thereof shall be included in the various contract bid items of Work; no additional payment will be made therefor.

Regardless of the size of the project as determined by the District, should the Contractor's failure to manage construction site activities in accordance with said District Ordinance 96-1 or said Guidelines, or to comply with the requirements of the State General Permit, thereby causing the District or other regulatory agency to require the Contractor to prepare a SWPPP and related documents where none would have otherwise been required, or if the Contractor fails to complete the Work by the expiration date of the Erosivity Waiver as above provided, the requirements of Sections 7-29.01, "National Pollutant Discharge Elimination System (NPDES) Compliance", through 7-29.01.4, "Preparation and Submittal of Notice of Termination", shall apply. No Work shall proceed after (i) notification is given to the Contractor that preparation of a SWPPP and related documents are required, or (ii) after the expiration date of the Erosivity Waiver, until the applicable requirements set forth in Section 7-29.01.2, "Preparation of Storm Water Pollution Prevention Plan (SWPPP), Site Map, and Construction Site Monitoring Plan (CSMP)", are satisfied and the Engineer authorizes Work to proceed. Unless otherwise determined by the Engineer, no contract time extension will be granted, all the provisions of Section 8-11, "Time of Completion", and Section 8-12, "Liquidated Damages", shall apply, and no additional compensation will be paid for compliance with said Sections 7-29.01 through 7-29.01.4.

For projects one (1) acre or greater in size, as determined by the District prior to advertising for bids for the Work, for which no Erosivity Waiver has been provided, in addition to complying with said District Ordinance 96-1 and said Guidelines, the Contractor shall comply with the following provisions.

7-29.01 National Pollutant Discharge Elimination System (NPDES) Compliance

When specified in the Special Provisions, or as provided in this Section 7-29, the Contractor shall comply with the requirements of the California State Water Resources Control Board, National Pollutant Discharge Elimination System General Permit for Storm Water

Discharges Associated with Construction Activity (hereinafter, "State General Permit"). Reference is made to said State General Permit, a copy of which is available for review at the District office.

7-29.01.1 Preparation of Permit Registration Documents; Payment of Fees

Unless otherwise specified in the Special Provisions, to be covered by the State General Permit for the Project the District will, at its expense, prepare all required Permit Registration Documents except the Permit-required Site Map and the Storm Water Pollution Prevention Plan (SWPPP) that includes the Construction Site Monitoring Plan (CSMP), submit them to the State, and pay the associated State General Permit application fee.

7-29.01.2 Preparation of Storm Water Pollution Prevention Plan (SWPPP), Site Map, and Construction Site Monitoring Plan (CSMP)

In addition to general compliance with the provisions of the State General Permit, the Contractor shall, within the time frame specified in the Special Provisions, , prepare and submit to the Engineer for review and approval a Site Map as required by State General Permit Attachment B, Section J, and a Storm Water Pollution Prevention Plan (SWPPP) that includes a site-specific Construction Site Monitoring Plan (CSMP) appropriate to the Project's Risk Level Determination made and provided to the Contractor by the District prior to preparation of the SWPPP. The SWPPP shall meet all the requirements of the State General Permit. To assure that the SWPPP is properly completed, the Contractor may consult with the District in its preparation.

Upon completion of the review of the SWPPP, the Site Map, and the CSMP by the Engineer, the Contractor shall make all necessary revisions and resubmit these documents to the Engineer. Upon final approval of the SWPPP, Site Map, and CSMP by the Engineer, the District will electronically forward these documents and the District-authored Permit Registration Documents to the State. In accordance with the requirements of the State General Permit, the Contractor may not begin on-site construction until the State issues a Waste Discharge Identification (WDID) Number to the project.

The approved Site Map and SWPPP with the CSMP shall be maintained at the construction site by the Contractor and at the Contractor's main office, and shall be available at all times for review by the Engineer, representatives of the State Regional Water Quality Control Board, or any other regulatory agency personnel. It is the Contractor's responsibility to provide all subcontractors with a copy of the SWPPP, who must also comply with the SWPPP requirements.

7-29.01.3 SWPPP and CSMP Implementation

The SWPPP and the associated CSMP shall be implemented by the Contractor and any subcontractors during all phases of Work at the site. The Contractor, in coordination with the District's Environmental Resources Manager or his/her designee, shall revise and amend the SWPPP as necessary during the progress of Work to comply with local, state, and federal storm water regulations, and the requirements of these Specifications and the

Special Provisions. All proposed revisions and amendments to the SWPPP shall be reviewed by the Engineer, whose approval and signed authorization are required prior to implementation. The District will be responsible for electronically entering revisions and amendments into the State General Permit SMARTS database. All revisions and/or amendments to the SWPPP shall be considered incidental to the initial preparation; no additional payment shall be made therefor. The Contractor is not responsible for implementing any post-construction control measures beyond any required landscape or other planting requiring specified maintenance periods. As used in this Section 7-29.01.3, post construction means after the Project has been formally accepted by the District as provided in Section 8-15, "Acceptance of Contract".

The Contractor shall provide for site monitoring, reporting, and training as required by the State General Permit and SWPPP during all phases of construction activities. All storm water pollution control measures implemented by the Contractor shall be inspected and maintained by a qualified representative of the Contractor in accordance with the SWPPP. The Contractor shall immediately repair or replace any control measures that are not operating properly. A representative of the Engineer will routinely inspect the construction site and any noted deficiencies shall be immediately corrected by the Contractor

During construction, the Contractor shall keep the Work site, areas adjacent to the Work site, and access roads in an orderly condition and free and clear from debris and discarded materials except stockpiles authorized by the Engineer. Care shall be taken to prevent spillage onto roadways during hauling activities. Any such spillage or debris on roadways resulting from Contractor's operations shall be immediately removed and properly disposed of.

Should the Contractor's failure to manage construction site activities or to comply with the requirements of the State General Permit cause or contribute to the reassignment of the site to a higher State General Permit Risk Level, the Contractor, at its expense, shall immediately implement and continue through to the completion of the Work all site and/or documentation improvements requested or required by the State Regional Water Quality Control Board, any other regulatory agency, or the Engineer. No additional payment will be made therefor.

The Contractor shall be responsible for any penalties or fines imposed upon the District by the State Regional Water Quality Control Board, State Water Resources Control Board, Environmental Protection Agency or other regulatory body due to the Contractor's or any subcontractor's noncompliance with the State General Permit. The actual cost of such penalties or fines will be deducted from any amount due, or that may become due, to the Contractor. The Contractor will also be responsible for the cost of such penalties or fines which exceed the amount due, or that may become due, to the Contractor.

If, in the opinion of the Engineer, the Contractor fails to comply with any of the items addressed in the State General Permit or the SWPPP, and the Contractor is either unwilling or unable to remedy a deficiency, the Engineer may temporarily suspend all or

a portion of the Work and employ private or public work forces and equipment to correct the deficiency. The actual cost of employing such forces and equipment shall then be deducted from any amount due, or that may become due, to the Contractor. This cost shall be deducted each time the Contractor fails to comply. Such action taken by the Engineer shall not relieve the Contractor of the responsibility to comply with these Specifications. Any suspension ordered by the Engineer for noncompliance will not be accepted as the basis for additional time or compensation.

Upon final inspection of the Work site, the Contractor shall certify to the Engineer that the construction activity has been completed, the SWPPP was properly implemented, construction and equipment maintenance waste have been disposed of properly, and that the site is in compliance with all local, state and federal storm water quality regulations. This certification shall be provided to the Engineer in writing before acceptance of the Work by the District.

7-29.01.4 Preparation and Submittal of Notice Of Termination

Following completion and acceptance of the Work by the District, the Engineer will prepare and submit a completed Notice of Termination (NOT) to the State Regional Water Quality Control Board.

7-29.01.5 Measurement and Payment

For projects one (1) acre or more in size, as determined by the District, for which no Erosivity Waiver is provided, full compensation for all Work necessary for Water Pollution Prevention as specified in Section 7-29.01.2, "Preparation of Storm Water Pollution Prevention Plan (SWPPP), Site Map, and Construction Site Monitoring Plan (CSMP)", and Section 7-29.01.3, "SWPPP and CSMP Implementation", shall be included in the contract bid item provided therefor. No additional payment will be made therefor. The Engineer may phase partial payments for the duration of the Contract as appropriate for the percentage of completion of the Work as herein required. If no bid item is provided, the cost shall be included in the various bid items of work, and no additional payment will be made therefor.

7-30 Use of Pesticides

As used in this Section, Pesticides shall include, but shall not be limited to herbicides, insecticides, fungicides, rodenticides, germicides, nematocides, bactericides, inhibitors, fumigants, defoliants, desiccants, soil sterilants, repellants, and substance or mixture of substances intended for preventing, repelling, mitigating, or destroying weeds, insects, diseases, rodents, or nematodes and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant.

The Contractor shall comply with all rules and regulations of the California Department of Food and Agriculture, the Department of Health, the Department of Industrial Relations and all other agencies which govern the use of Pesticides required in the performance of the Work. In the use and application of Pesticides, the Contractor shall also comply with the all of the provisions of Section 7-29, "Water Pollution Prevention", and Section 7-29.01, "National Pollutant Discharge Elimination System (NPDES) Compliance".

Unless otherwise provided in the Special Provisions, full compensation for providing and applying Pesticides shall be included in the price bid for the various bid items of Work and no additional payment will be made therefor.

7-31 Disposal of Material

The Contractor shall make its own arrangements for the legal disposal of materials not otherwise to be placed within the limits of Work, and shall pay all costs therefor. In disposing of such material, the Contractor shall comply with all local, State, or Federal regulations and laws governing such disposal. Reference is also made to Section 7-20, "Trenches and Excavations-Hazardous Waste".

When any material is to be disposed of on private property, the Contractor shall first obtain written authorization from the owner and any tenants of the property upon which the disposal is to be made, and file said authorization with the Engineer. Such authorization shall include a release from the property owners and any tenant absolving the District from any and all responsibility in connection with the disposal of material on the property.

Unless otherwise provided in the Special Provisions, full compensation for all costs involved in disposing of materials as above specified, including all costs of hauling, shall be considered as included in the price paid for the Contract item of Work involving such materials, and no additional payment will be made therefor.

7-32 Electrical and Water Service

The Contractor shall provide and pay all costs for electrical service for all purposes of power and lighting required for the construction of the Work or for any temporary construction office, shelter, or other building to be occupied by the Contractor during the length of the Contract, and shall maintain such service until the completion of the Contract. Unless otherwise specified in the Special Provisions, for installations requiring a permanent electrical service after completion and acceptance of the Work by the District such as, but not limited to, a storm water pump station or irrigation booster pump, along with any associated lights and controllers, the District will make arrangements with the utility company for the permanent connections for electrical service and pay any fees associated therewith.

The Contractor shall make its own arrangements and pay all costs for, and shall provide itself with, a satisfactory water service supply for the Work to be done under the Contract or for supplying water to any temporary construction office, shelter, or other building to be occupied by the Contractor during the length of the Contract.

Unless otherwise specified in the Special Provisions, for Projects requiring a permanent water supply after the completion and acceptance of the Work by the District such as, but not limited to, a landscape irrigation system installation which will need water for operation after the Work is completed, the District will make arrangements with the water supplier to allow for the permanent connections for water service and pay any fees associated therewith. The Contractor, however, shall make its own arrangements and pay all costs for construction water required to

construct the facility needing a permanent water supply and the connections to the water supplier's system.

Unless otherwise provided in the Special Provisions, and except as otherwise provided in this Section 7-32 for permanent services, all costs for furnishing Electrical and Water Service as specified shall be included in the various Contract items of Work, and no additional payment shall be made therefor.

7-33 Sound Control Requirements

The Contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any Work performed pursuant to the Contract. This may include restrictions on the hours of the day or days of the week during which work may be performed. It shall be the Contractor's responsibility to determine any such restrictions from the appropriate jurisdictional agency prior to submission of a bid. Each internal combustion engine used for any purpose on the job or related to the Work shall be equipped with a muffler system of a type recommended by the manufacturer or required by State or Federal regulations, whichever is more restrictive. No internal combustion engine shall be operated on the project without such a muffler system. Any costs for compliance with sound control requirements shall be included in the prices bid for the various Contract Items, and no additional payment shall be made therefor.

7-34 Right-of-Ways, Easements, Work Areas

The District has procured all the right-of-ways and easements necessary for the conduct of the Work shown on the Plans and specified in the Special Provisions. The Contractor shall procure, at no cost to the District, all temporary construction easements not identified in the Contract Documents as existing easements which it may deem necessary to carry out the Work to be done under the Contract.

The Contractor shall not enter or occupy property outside the right-of-way or easements shown on the Plans for any purpose including, but not limited to, storage of equipment or materials, except by written agreement with the owner of said property and any tenant thereof. The Contractor shall, following prior written notice to the Engineer, make its own arrangements, pay all expenses for, and assume all responsibility for acquiring, using, and disposing of additional Work areas and facilities temporarily required by it outside of the limits of the Work area identified on the Plans or specified in the Special Provisions. Said additional Work areas shall be restored to a condition at least equal to that existing prior to its use by the Contractor, as determined by the Engineer.

Full compensation for all costs involved in procuring all temporary construction easements or Work areas, including all fees and charges, shall be included in the amount bid for the various Contract items of Work, and no additional payment shall be made therefor.

SECTION 8 - PROSECUTION AND PROGRESS OF THE WORK**8-1 Commencement of the Work**

Unless otherwise provided in the Special Provisions, the Contractor shall commence work under the Contract within ten (10) calendar days after the date specified in the Notice to Proceed, and shall diligently prosecute the same to completion within the time limits provided in the Special Provisions. Should the Contractor begin Work in advance of the date specified in the Notice to Proceed as above provided, any Work performed by it in advance of said date shall be considered as having been done by the Contractor at its sole risk; the Contractor shall not be entitled to compensation therefor unless the Engineer approves and accepts such Work performed before said date.

8-2 Notice To Residents

Not less than two (2) calendar days nor more than five (5) calendar days prior to proceeding with the Work in any given area, the Contractor shall notify in writing all residents and tenants directly affected by the Work. Such notice shall provide the nature of the Work, the approximate time for the completion of work, and any anticipated inconveniences. The notice shall be on the contracting firm's letterhead and shall be signed and shall include the project superintendent's name and telephone number, and the names and telephone numbers of persons to contact for after-hour emergencies. Prior to commencing Work in any given area, the Contractor shall furnish the Engineer a copy of the notice given to residents and tenants and shall certify the date, location and method by which the notice was delivered

For every occurrence when property access, sewer service or water source is to be interrupted by the Contractor's work, the Contractor shall give written notice to all affected residents/tenants not less than two (2) calendar days nor more than five (5) calendar days prior to said interruption. The notice(s) shall be in addition to the initial notice to residents described above.

All costs for compliance with this Section 8-2 shall be included in the various bid items of Work, and no additional payment will be made therefor.

8-3 Subcontracting

Reference is made to Section 7-9, "Contractor's Licensing Laws". All subcontractors used in the Work shall be licensed in accordance with the provisions of Division 3, Chapter 9, of the Business & Professions Code of the State of California, and shall possess the license classification applicable to the Work being subcontracted.

Subcontracts shall include provisions that the Contract between the District and the Contractor is part of the subcontract, and that all terms and provisions of the Contract are incorporated in the subcontract. Subcontracts shall also contain certification by the subcontractor that the subcontractor is experienced in and qualified to do, and knowledgeable about, the subcontracted Work. Copies of subcontracts shall be available to the Engineer upon request, and shall be provided to the Engineer at any time any litigation against the District concerning the Project is filed.

Pursuant to the provisions of Section 6109 of the Public Contract Code, the Contractor shall not perform Work on a public works project with a subcontractor who is ineligible to perform Work on the Public Works Project pursuant to Section 1777.1 or 1777.7 of the Labor Code.

Reference is made to Section 2-8, "Required Listing of Proposed Subcontractors", and Section 5-14, "Subcontractor's Operations". Once the bid proposal has been accepted by the District, substitution of a subcontractor listed on the original bid proposal will only be permitted as provided in said Section 2-8.

In compliance Section 4109 of the State Public Contract Code, subcontracting of any portion of the Work in excess of one half of one (½) percent of the Contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases where the Board makes a finding of public emergency or necessity, and sets forth the facts constituting the emergency or necessity in writing, and directs the written finding and facts to be made a part of the public record of the Board's action. If the Contractor proceeds to subcontract any portion of the Work in the absence of a Board finding approving such subcontracting, the Contractor shall be subject to the penalties provided in Public Contract Code Section 4111.

8-4 Assignment

The performance of the Contract may not be assigned, except upon the written consent of the District. Consent will not be given to any proposed assignment which would relieve the original Contractor or the Contractor's surety of their responsibilities under the Contract, nor will the District consent to any assignment of a part of the Work under the Contract.

The Contractor may assign moneys due or to become due the Contractor under the Contract and the assignment will be recognized by the District, if given proper notice thereof, to the extent permitted by law, but any assignment of moneys shall be subject to all proper set-offs in favor of the District and to all deductions provided for in the Contract and particularly all money withheld, whether assigned or not, shall be subject to being used by the District for the completion of the Work in the event that the Contractor shall be in default therein.

8-5 Progress of the Work

In compliance with Section 5-5, "Pre-Construction Conference, Notice to Proceed", and Section 5-6, "Order of Work; Schedule of Operations", the Contractor shall submit for the Engineer's approval a schedule of operations. For pipeline and related structural facilities construction, such schedule shall incorporate as a minimum the below-listed requirements.

8-5.01 Surfacing Removal

Reference is made to Section 14-3, "Trench and Structure Excavation". Existing asphalt concrete or other surfacing at any location shall be removed from proposed trench or structure excavation areas no sooner than forty-eight (48) hours prior to trenching or excavating at that location. No surfacing shall be removed on a Friday or the day preceding a legal holiday unless trenching and follow-up work as required by the Engineer occur the same day. Where asphalt concrete or other surfacing is to be removed by grinding, and the remaining surfacing is suitable for maintaining traffic use as determined by the jurisdictional

agency and the Engineer, such grinding may proceed at an earlier time as approved by the Engineer in writing.

8-5.02 Open Trench/Structure Excavation Time Limits

In accordance with said Section 14-3, pipe shall be constructed or placed in the trench as soon as practicable after trenching, but in no case shall the trench be excavated more than one (1) calendar day before pipe laying or construction. No trench will be permitted to be excavated on a Friday or the day preceding a legal holiday that is not to receive pipe on the same day. These requirements may be modified by the Engineer, under certain unusual circumstances, to allow up to a maximum trench length of one hundred fifty (150) feet to be left open for a length of time greater than one (1) calendar day (as specified by the Engineer), provided that access to affected properties can adequately and safely be provided and maintained, and the trench is properly barricaded and suitably marked. In locations where the trench is allowed to be left open for extended periods (i.e. Holiday Weekends) , the Contractor may also be required by the Engineer to furnish and install steel trench plates for access, traffic, or safety reasons at locations determined by the Engineer, with no additional payment made therefor. These same time limits shall apply to structure excavation sites, except that the time-lag limit shall apply to the time between excavation of the site and the commencement of placing concrete forms or pre-cast structures where permitted. New manholes constructed in-line with new pipelines shall use the same time limits applied to the pipeline.

8-5.03 Trench/Structure Backfill Time Limits

Backfill material shall be returned to trench and structure excavation sites in accordance with the time limits set forth in Section 15-4.01, "Trench Backfill; Cast-in-Place Concrete Pipe", Section 15-4.02, "Trench Backfill; Pre-cast Pipe", and Section 15-5, "Structure Backfill".

8-5.04 Compaction, Surface Restoration

Compaction and surface restoration shall be completed as soon as practicable, in accordance with Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction", and Section 16, "Restoration of Surfaces". In no case shall replacement of pavement exceed the time limits specified in the Special Provisions.

8-5.05 Traffic and Dust Control; Access

Traffic Control, Dust Control, and access to properties shall be provided and maintained in compliance with Section 7, "Legal Relations and Responsibilities" as soon as possible. Should access or traffic considerations warrant, the Engineer may direct backfilled, unpaved trenches to be filled level with adjacent pavement, compacted and smoothed in a suitable manner to allow passage of vehicles. No additional payment will be made therefor, and the cost thereof shall be considered as included in the various bid items of Work.

Reference is made to Section 15-7, "Emergency Backfill". At locations where traffic, safety, or other conditions warrant, the Engineer may order the immediate backfill of a trench or other excavation whether the pipe or structure has been installed or not. The backfill may not be re-excavated until the cause of the condition has been remedied.

8-6 Underground Utilities Markout

The Contractor shall comply with Section 10-1, “Underground Utility Locations, Markout”, and Government Code Section 4216.2 relating to the notification and markout requirements for all underground utilities prior to commencement of any Work. As used in this Section 8-6, the definition of Utilities shall be as specified in Section 1-42, “Utility”.

8-7 Initial Clean-up During Construction

Initial Clean-up shall include, but not be limited to, the removal of all excess soil and other materials or debris from the construction area, including irrigation and landscape projects in District retention basins, and sweeping and cleaning affected streets and sidewalks, and shall be accomplished as soon as practicable and as public necessity and convenience require, as determined by the Engineer. The Contractor shall comply with Section 7-31, “Disposal of Material”, when disposing of any material off the site of the Work. Haul roads to and from excavation sites shall be cleaned and swept periodically during construction operations. The Engineer may specify, whenever conditions warrant, the intervals at which cleaning and sweeping shall occur. Such prescribed intervals may vary between daily cleaning to weekly cleaning, as conditions may warrant.

In no case shall the clean-up follow pipe installation by more than the following:

1. At locations where cast-in-place concrete pipe is installed as provided in these Specifications, initial clean-up shall be completed within ten (10) working days after construction of the pipe.
2. At locations where RCP, PVC, Corrugated Metal, or HDPE pipe is installed as provided in these Specifications, initial clean-up shall be completed within five (5) working days after pipe installation.

In accordance with Section 8-10, “Temporary Suspension of Work”, failure to comply with these time requirements shall be sufficient cause for the Engineer to temporarily suspend any portion or all of the Work until any and all deficiencies are corrected. If the Contractor fails to correct the deficiencies during the suspension within the time specified by the Engineer, the Engineer may immediately order the Initial Clean-up measures be done by others, with the cost thereof deducted from any monies owed the Contractor, or the cost thereof paid directly to the District by the Contractor. The suspension will be lifted only upon completion of Initial Clean-up measures. No time extension to the Contract will be permitted for any suspension ordered by the Engineer as herein provided.

Following the Initial Clean-up, the Engineer may require subsequent cleanup to be performed, as conditions warrant, until all of the Work is complete and final clean-up is commenced in accordance with Section 8-8 “Final Clean-up”.

The foregoing are minimum requirements; each jurisdictional agency may also impose additional clean-up requirements, to which the Contractor shall comply. The Contractor shall also comply with Section 7-26, “Dust Control”, during and between clean-up operations.

No separate payment for Initial Clean-up or subsequent clean-up during construction shall be made; full compensation therefor shall be considered to be included in the various Contract bid items of work.

8-8 Final Clean-up

Reference is made to Section 5-16, "Final Inspection". When construction is completed, including irrigation and landscape projects in District retention basins, and prior to application for acceptance of the Work, the Contractor shall clean all Work areas, approaches to Work areas, and all grounds occupied by it in connection with the Work, of all debris, excess materials, temporary structures and equipment. All portions of the Work shall be left in a neat presentable condition. The roadways in which trenching operations have been accomplished, as well as all haul roads upon which spillage has occurred, shall be swept clean, as directed by the Engineer. Roads adjacent to construction activity which have dirt or debris tracked from the construction area shall also be swept and cleaned.

All pipelines, manholes, inlets, or any other structure installed by the Contractor shall be clean and free of all mud, loose mortar and debris, including any mud or debris accumulated in the storm drain system due to the Contractor's operations. Any existing pipelines, manholes, inlets, or other structures within the limits of the Work which were connected to the new Work as called for on the Plans or specified in the Special Provisions shall also be cleaned of all mud or debris, whether such material was pre-existing or not.

Final Clean-up shall be completed in all respects as directed by the Engineer, including any additional clean-up required by the jurisdictional agency, prior to acceptance of the Work. Full compensation for Final Clean-up shall be included in the prices bid for the various items of Work, and no additional payment will be made therefor unless otherwise specified in the Special Provisions.

8-9 Right Of Way Delays

The District makes a diligent effort at securing a clear right of way for the performance of the work required by the contract. For some contracts, it is in the best interests of the District and/or the public to award a contract before all utility relocations, utility undergrounding, right of way purchases, removal of obstructions, relocation of underground facilities by others, or other potential causes of delay are removed. Where known, these will be shown on the Plans with the actions to be taken, and enumerated in the Special Provisions. The District will make every effort to ascertain the approximate time required to clear the right of way and so indicate in the Special Provisions. The contractor shall also make a diligent effort by contacting the owner/agency/company of the time expected to clear the right of way before submitting a bid. In so doing, the contractor shall include in its costs any delays that can be expected or result from such relocations or acquisitions. The Engineer may grant a time extension deemed warranted due to such delays, or may temporarily suspend the contract in accordance with Section 8-10, "Temporary Suspension of Work". Section 7102 of the State Public Contract Code notwithstanding, no additional compensation will be paid for such delays.

If new and unforeseen right of way delays not contemplated before the award of the Contract causes the Contractor to sustain a loss which could not have been avoided by the judicious handling of forces, equipment, and plant, there shall be paid to the Contractor that amount that the Engineer may find to be a fair and reasonable compensation for that part of the Contractor's actual loss that, in the opinion of the Engineer, was unavoidable. Payment will be determined on the basis of extra work on a force account basis, or as otherwise agreed to by and between the Engineer and the Contractor, in accordance with Section 4-4, "Extra Work".

8-10 Temporary Suspension of Work

The Engineer shall have the authority to suspend the Work wholly or in part, for such period as he may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as the Engineer may deem necessary due to the failure on the part of the Contractor to carry out adequate worker protection or safety provisions, traffic control, dust control, SWPPP implementation, initial cleanup, or any other orders given or to perform any provision of the Contract. The Contractor shall immediately comply with the written order of the Engineer to suspend the Work wholly or in part. The suspended Work shall be resumed when conditions are favorable and methods or noted deficiencies are corrected as ordered or approved in writing by the Engineer. Reference is made to Section 8-14, "Termination of Contract".

Should the Contractor continue working after receiving a written order from the Engineer to suspend such Work, no payment will be made to the Contractor for that portion of the Work performed during such suspension unless the Engineer subsequently approves and accepts said Work.

Should the Contractor temporarily suspend a portion or all of the Work for any reason for a period of twenty-four (24) hours or more, exclusive of Saturdays, Sundays or holidays, it shall notify the Engineer twenty-four (24) hours in advance of re-instituting any construction activity.

8-11 Time of Completion

The Contractor shall complete all or any designated portion the Work called for under the Contract in all parts and requirements within the time limits set forth in the Special Provisions. The Engineer may extend the time limit due to conditions outside the Contractor's control which, in the Engineer's opinion, affected the ability of the Contractor to complete the Work within the time specified. Such conditions may include, but not be limited to, rain or other inclement weather conditions. In accordance with Section 4-3, "Changes", the Engineer may also increase or decrease the time limit for Work added to or deleted from the original Contract.

Amendments to the Contract time limits shall be at the sole discretion of the Engineer, and shall be made only in writing. As specified in these Specifications, temporary suspensions ordered by the Engineer due to failure of the Contractor to perform operations ordered by the Engineer shall not be grounds for an extension of the Contract time limits.

8-12 Liquidated Damages

It is agreed by the parties to the Contract that in case all the Work called for under the Contract is not completed before or upon the expiration of the time limits as set forth in the Special

Provisions, damage will be sustained by the District, and that it is and will be impracticable to determine the actual damage which the District will sustain in the event of any such delay; and it is therefore agreed that the Contractor shall pay to the District the sum set forth in the Special Provisions per day for each and every calendar day's delay beyond the time prescribed to complete the Work. The Contractor agrees to pay such liquidated damages as herein provided and, in case the same are not paid, agrees that the District may deduct the amount thereof from any money due or that may become due the Contractor under the Contract.

It is further agreed that in case the Work called for under the Contract is not finished and completed in all parts and requirements within the time specified, in accordance with Section 8-11, "Time of Completion", the District shall have the right to extend the time for completion or not, as may seem best to serve the interest of the District, and if it decides to extend the time limit for the completion of the Contract, it shall further have the right to charge to the Contractor, his heirs, assigns or sureties, and to deduct from the final payment for the Work, or any part thereof, as it may deem proper, the actual cost of engineering, inspection, superintendence and other overhead expenses which are directly chargeable to the Contract and which accrue during the period of such extension, except that cost of final surveys and preparation of the final estimate shall not be included in such charges.

The Contractor shall not be assessed liquidated damages or the cost of engineering and inspection for any delay in the completion of the Work caused by acts of God or of the public enemy, acts of the District, fire, floods, epidemics, quarantine restrictions, freight embargoes, and unusually severe weather or delays of subcontractors or materialmen due to such causes, nor shall the Contractor be assessed liquidated damages for delay in completion of the work if caused by failure of the District or the owner of existing main or trunk-line facilities not indicated on the Plans or specified in the Special Provisions to provide for removal or relocation of such utility facilities; provided, that the Contractor shall promptly, upon the beginning of any such delay, notify the Engineer in writing of the causes of delay, who shall ascertain the facts and extent of delay, and his findings of the facts thereon shall be final and conclusive.

8-13 Cooperation

In performing the Work, the Contractor shall cooperate in all respects with all public agencies or private entities having an interest in or permit authority over the Work, and any of their work forces or contractors. Should construction be under way by other forces or by other contractors within or adjacent to the project area, or should work of any other nature be under way by other forces within or adjacent to the project area, the Contractor shall cooperate with all such other contractors or forces to minimize or eliminate any delay in or hindrance to their work. Prior to submitting a bid for the Contract, the Contractor shall have made itself aware of the potential presence of other forces or contractors at the site of the Work, and incorporated any costs for delays in the various bid items of Work, and no additional payment will be made therefor.

8-14 Termination of Contract

Reference is made to Section 7-2, "Modification, Amendment, or Termination of Contract". If the Contractor files for bankruptcy; if the Contractor makes a general assignment for the benefit of his creditors; if a receiver should be appointed on account of the Contractor's insolvency; if the Contractor has failed to make prompt payment to subcontractors or for materials and labor; if

the Contractor or any subcontractors should violate any provisions of the Contract; if at any time the Engineer determines that the Contractor has failed to supply an adequate work force or material of proper quality, or has failed in any other respect to prosecute the Work with diligence and force specified and intended in and by the terms of the Contract; or if the Contractor should disregard laws, ordinances, or the instructions of the Engineer; the District may serve written notice upon the Contractor and the Contractor's surety of the District's intention to terminate the Contract. The notice shall contain the reasons for such intention to terminate the Contract, and provide five (5) calendar days for the Contractor to cure and make satisfactory arrangements to remedy or correct all violations, failures to perform, or any other causes of the intended suspension. If within the five (5) calendar days after serving such notice of intention to terminate the Contract such violations or other causes as above provided do not cease and satisfactory arrangements for corrections thereof are not made, then the District may, at its discretion, terminate the Contract at any time thereafter.

In the case of filing for bankruptcy, the Contractor agrees that by executing the Contract it also stipulates that the bankruptcy court may grant relief to the District from any automatic stay as to the Contract (and as to any escrow agreement) so that the District may proceed pursuant to this provision and terminate the Contract if necessary.

In the event of any such termination, the District shall immediately serve written notice thereof upon the Contractor and the Contractor's surety; and the surety shall have the right to take over and perform the Contract, provided, however, that if the surety within ten (10) calendar days after the serving upon it of notice of termination does not give District written notice of its intention to take over and perform the Contract or does not commence performance thereof within the ten (10) calendar days stated above from the date of the serving of such notice of termination, the District may take over the Work and prosecute the same to completion by Contract or by any other method it may deem advisable, for the account and at the expense of the Contractor and the Contractor's surety, and the Contractor and the Contractor's surety shall be liable to the District for any excess cost incurred by the District. In such event the District may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plant and other property belonging to the Contractor as may be on the site of the Work and necessary therefor. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract price shall exceed the expenses of finishing the Work, including compensation for additional managerial and administration services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor and its surety shall pay the difference to the District. The expense incurred by the District, as herein provided and damage incurred through the Contractor's default, shall be certified by the Engineer.

Upon such termination, the Contractor shall notify all of its employees that any complaint or other communication received by them from residents or tenants shall be referred to the Contractor's project superintendent, who shall give prompt written notice thereof to the Engineer.

Any termination by the District under this Section 8-14, or suspension by the District under Section 8-10, "Temporary Suspension of the Work", shall not act as a waiver of any claims by

the District against the Contractor or others for damages based on breach of contract, negligence or other grounds.

The Contractor does not have the right to terminate the Contract or to suspend or slow down its performance of the Work. If the Contractor believes that it is entitled to additional compensation (money and/or time) for any reason, or that it has been wronged for any reason, then it may submit a request for additional compensation and/or modification of the Contract; however, despite such requests as Contractor may make or disputes as may exist, Contractor shall continue to diligently prosecute the Work, and acceptably perform the Work, as required by the Contract through completion.

8-15 Acceptance of Contract

When the Engineer has made the final inspection as provided in Section 5-16, "Final Inspection", and determines that the Work as required under the Contract has been fully completed in all respects in accordance with the Contract Documents, the Engineer shall issue a Notice of Acceptance of the Contract and file, for recording, a Notice of Completion with the County Recorder's Office. Immediately upon and after issuance of said Notice of Acceptance, unless otherwise provided in the Contract Documents, the Contractor shall be relieved of the duty of maintaining and protecting the Work. However, the District's acceptance of any Work done by or on behalf of the Contractor, shall not be deemed a waiver of the District's rights to remedy by the Contractor of defects, whether resulting from defective materials, workmanship, or otherwise, as provided in these Specifications. Reference is made to Section 6-9, "Guarantee of Materials and Workmanship". No inspection by or on behalf of the District shall be deemed a waiver by the District of the Contractor's full compliance with the requirements of these Specifications, the Plans, and the Special Provisions. Reference is made to Section 9-10, "Final Payment".

SECTION 9 - MEASUREMENT AND PAYMENT

9-1 Measurement of Quantities

All work to be paid for at a contract price per unit of measurement (linear or sq. feet, sq. yard, cubic yard, etc.) will be measured by the Engineer in accordance with the U.S. Customary Units of Measurement.

Quantities of work shall be determined from measurements or dimensions in horizontal planes, except quantities of pipe, fencing, or other items based on linear measurement shall be considered as being the true length measured along the longitudinal axis.

When payment is to be made on the basis of weight, the weighing shall be done on scales furnished by and at the expense of the Contractor, or on other sealed scales regularly inspected by the State of California, Department of Food & Agriculture, Division of Measurements & Standards, or its designated representative. All scales shall be suitable for the purpose intended. The scales shall be operated by a weigh-master licensed in accordance with the provisions of the California Business and Professions Code. The Contractor shall furnish a Public Weigh-master's certificate or a Private Weigh-master's certificate of certified daily summary weight sheets. The operator of each vehicle shall obtain a weight or load slip from the Weigh-master and deliver said slip to the Engineer at the point of delivery of the material.

Work to be paid for on an "each" or "lump sum" basis will be measured as an entire unit. Unless partial or pro-rated payments are otherwise provided in these Specifications or specified in the Special Provisions, payment will be made only upon a determination by the Engineer that the work on individual "each" or "lump sum" item is complete in all respects. Reference is made to Section 9-2, "Cost Breakdown".

Other materials and items of work which are to be paid for on the basis of measurement shall be measured in accordance with the methods stipulated in these Specifications, or the Special Provisions for the particular items involved.

Full compensation for all costs involved in conforming to the requirements specified for measuring and weighing materials shall be considered as included in the unit price paid for the materials being measured or weighed and no additional payment will be made therefor.

9-2 Cost Breakdown

Upon request of the Engineer, the Contractor shall submit, in a form acceptable to the Engineer, a schedule showing the subdivision of "lump sum" bid prices into their various parts and stating quantities and prices for each part, to be made a basis for checking or computing monthly estimates, if such partial payments for "lump sum" items are specified in the Special Provisions. The prices shall include all costs of each item. The schedule of values shall be balanced and shall not shift excessive portions of the contract price into any particular part of the Work, especially parts of the Work being performed earlier in the schedule. No partial payment will be made to the Contractor until such schedule has been submitted to and approved by the Engineer, if required.

9-3 Final Pay Items

When an item of work is designated as (F) in the Engineer's Estimate of Quantities, or is otherwise indicated in the Special Provisions as a Final Pay Item, the estimated quantity for that item of Work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of Work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions. If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of Work.

The estimated quantity for each item of Work designated as (F) or indicated otherwise as a final pay item in the Engineer's Estimate of Quantities shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the Plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantities shown in the Engineer's Estimate of Quantities for a final pay item and the quantity or summation of quantities for the same item shown on the Plans, payment will be based on the quantity shown in the Engineer's Estimate of Quantities.

9-4 Scope of Payment

The Contractor shall accept the compensation provided in the Contract as full payment for furnishing all labor, materials, tools, equipment, and incidentals necessary to the completed Work, for performing all Work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work until the acceptance by the Engineer and for all risks of every description connected with the prosecution of the Work; also for the expenses incurred in consequence of the suspension or discontinuance of the Work as provided in these Specifications; and for completing the Work according to the Plans, these Specifications, and the Special Provisions. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of the obligation to make good any defective Work or material.

No additional payment will be made in any case for loss of anticipated profits.

9-5 Payment for Extra Work

Extra Work as defined in Section 4-4, "Extra Work", when ordered and accepted by the Engineer, shall be paid for under a written work order (Contract Change Order) in accordance with the terms therein provided. Payment for Extra Work will be made at the unit or lump sum price, or on a force account basis, as agreed upon by the Contractor and the Engineer.

When Extra Work is to be paid for on a force account basis, the Contractor shall receive the actual cost of all materials furnished by it as shown by its paid vouchers, plus fifteen (15) percent, and for all equipment that is necessary it shall receive the current prices in the locality, which shall have been previously determined and agreed to in writing by the Engineer and by the Contractor, plus fifteen (15) percent. The furnishing of labor and the price paid therefor by the Contractor shall comply with all of the requirements of Section 7, "Legal Relations and Responsibilities", including all payments imposed by State and Federal laws.

The Contractor shall maintain its records in such a manner as to provide a clear distinction between the direct costs of Extra Work paid for on a force account basis and the costs of other operations.

The Contractor shall furnish the Engineer report sheets in duplicate of each day's Extra Work paid for on a force account basis no later than the working day following the performance of said Extra Work. The daily report sheets shall itemize the materials used, and shall cover the direct cost of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces. The daily report sheets shall provide names or identifications and classifications of workmen, the hourly rate of pay and hours worked, and also the size, type and identification number of equipment and hours operated.

Material charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily report sheets, if available. Said daily report sheets shall be signed by the Contractor or its authorized agent.

The Engineer will compare its records with the daily report sheets furnished by the Contractor, make any necessary adjustments, and compile the costs of Work to be paid for on a force account basis. The compilation, when agreed upon and signed by both parties, shall become the basis of payment for the Extra Work performed.

Payment as provided above shall constitute full compensation to the Contractor for performance of Extra Work paid for on a force account basis, and no additional payment will be made therefor.

If determined by the Engineer to be applicable, the Contractor will be entitled to any increase in Performance or Payment Bond costs related to such Extra Work.

If the Contractor and the Engineer cannot agree on the force account price to be paid for Extra Work, or if the Contractor and the Engineer cannot agree that certain Work is Extra Work, the Contractor shall proceed with the ordered Work in a timely manner and as directed by the Engineer in the absence of an executed Contract Change Order. The Contractor shall immediately file with the Engineer a notice in writing of its intention to submit a claim for the disputed costs as provided in Section 9-6, "Notice of Potential Claim". Undisputed prices will be paid for along with the other Contract Work. Upon completion of the ordered Work, the Contractor shall submit a claim for the disputed amount in writing to the Engineer in accordance with said Section 9-6.

9-6 Notice of Potential Claim

In the event that a dispute over the conduct or payment of any portion of the Work was not resolved by issuance of a Contract Change Order or other agreement between the Contractor and the Engineer, and it is the intent of the Contractor to submit a claim to resolve the matter, the Contractor shall file with the Engineer a written notice of such intent. Such Notice of Potential Claim shall be filed at the earliest possible time to permit early resolution, if possible, but in any case, within five (5) calendar days after the Engineer's decision not to issue a Contract Change Order or to enter into some other form of agreement. The Notice shall provide the nature and circumstances involved in the dispute, which shall remain consistent throughout the dispute. No claim will be considered by the District without the Contractor having first filed with the Engineer said Notice of Potential Claim. Submittal of claims shall comply with Section 9-11, "Claims".

9-7 Progress Payments and Retentions

Once each month on a schedule prescribed by the District, the Engineer will prepare an estimate in writing on District forms of the total amount of Work done by the Contractor that is eligible for payment. When applicable, as determined by the Engineer, the estimate may include the value thereof of acceptable materials furnished and delivered by the Contractor to the site of the Work, but not used at the time of such estimate. The District shall pay monthly to the Contractor the balance after deducting from the estimate all previous payments and all sums to be kept or retained under the provisions of the Contract and as herein specified.

The District shall retain five (5) percent of the estimated value of the Work done and five (5) percent of the value of materials so estimated to have been furnished and delivered and unused as part security for the fulfillment of the Contract by the Contractor. In addition to the five (5) percent retention, the District may withhold further amounts for other causes as specified in Section 9-9, "Stop Notices; District's Right to Withhold Payments".

No such estimate or payment shall be required to be made when, in the judgment of the Engineer, the Work is not proceeding in accordance with the provisions of the Contract, or when in his judgment the total value of the Work done since the previous estimate amounts to less than Two Thousand Five Hundred (2,500) Dollars. No monthly estimate or payment shall be construed to be an acceptance of any defective Work or improper materials.

9-8 Substitutions for Five (5) Percent Retention

Reference is made to the retention provisions of Section 9-7, "Progress Payments and Retentions". Upon the Contractor's request and at its expense, pursuant to Public Contract Code Section 22300, the District will make payment to the Contractor of funds withheld from progress payments to ensure performance of the Contract if the Contractor deposits in escrow with the District, approved securities equivalent to the amount withheld. If said securities are deposited by the Contractor with a State or Federally chartered bank in the State of California as the escrow agent, the District will make payment to said bank, which bank shall then pay those moneys to the Contractor. In either case, payment of withheld funds shall be subject to Section 9-9, "Stop Notices; District's Right to Withhold Payments". The Contractor shall be beneficial owner of any securities substituted for moneys withheld and shall receive any interest thereon. Upon satisfactory completion of the Contract, the securities shall be returned to the Contractor.

Securities eligible for investment shall include those listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest-bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by the Contractor and the District.

Alternatively, as provided in said Section 22300, upon the Contractor's request and at its expense, subject to the provisions of said Section 9-9, the District will make payment of retentions earned directly to an escrow agent. The Contractor may direct the investment of the payments into securities, and the Contractor shall receive the interest earned on the investments upon the same terms provided for securities deposited by the Contractor. Upon satisfactory completion of the Contract, the Contractor shall receive from the escrow agent all securities, interest and payments received by the escrow agent from the District, pursuant to the terms in said Section 22300

The escrow agreement used pursuant to this Section 9-8 shall be substantially similar to the "Escrow Agreement for Security Deposits In Lieu of Retention" in Section 22300 of the Public Contract Code, deemed as incorporated herein by reference. The Contractor shall obtain the written consent of the surety to the agreement.

If the Contractor elects to utilize these provisions, it shall comply with the requirements of said Section 22300 as they apply to providing available options to subcontractors. The Contractor shall also compensate the District its administrative and handling costs.

9-9 Stop Notices; District's Right to Withhold Payments

In addition to the five (5) percent withheld as specified in Section 9-7, "Progress Payments and Retentions", pursuant to Civil Code Section 3186, for valid Stop Notices filed against any part of the Work of the Contract, the District may withhold from any moneys due the Contractor an amount sufficient to answer the claim stated in the Stop Notice and to provide the District's reasonable cost of any litigation resulting therefrom. In lieu of such withholding, the Contractor may at its sole expense provide a bond or other security satisfactory to the District in the amount of at least one hundred twenty-five (125) percent of the claim, in a form satisfactory to the District, which protects the District against such claim. Any Stop Notice release bond shall be executed by a California admitted, fiscally solvent surety, completely unaffiliated with and separate from the surety on the payment and performance bonds, that does not have any assets pooled with the payment and performance bond sureties. The District may also refuse to release money held in escrow pursuant to Section 9-8, "Substitutions for Five (5) Percent Retention". For any Stop Notice resolved and/or released, the District may withhold any reasonable cost of litigation actually incurred for that Stop Notice.

The District may also withhold or nullify the whole or any part of any partial or final progress payment or any release of retention to such extent as may reasonably be necessary to protect the District from loss on account of, but not limited to, the following:

- a. Defective work not remedied, irrespective of when any such work became defective;

- b. Failure of the Contractor to make proper payments for labor, material, equipment, other facilities, or to subcontractors;
- c. Any penalties provided in these Specifications or the Special Provisions for failure of the Contractor to carry out specific orders of the Engineer.
- d. Liquidated damages against the Contractor, whether already accrued or estimated to accrue in the future;
- e. Reasonable doubt that the Work can be completed for the unpaid balance of any Contract Sum or by the completion date;
- f. Damage to the property or Work of the District, another contractor, or subcontractor;
- g. Unsatisfactory prosecution of the Work by the Contractor, and/or failure to perform all required Work;
- h. Failure to store and properly secure materials;
- i. Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, monthly progress schedules, shop drawings, submittal schedules, schedule of values, product data and samples, proposed product lists, executed Contract Change Orders, and verified reports;
- j. Failure of the Contractor to maintain and submit record as-built drawings where required;
- k. Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment;
- l. Unauthorized deviations from the Contract Documents;
- m. Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and completion dates;
- n. Subsequently discovered evidence or observations nullifying the whole or part of a previously issued Change Order or Certificate for Payment;
- o. Previous overpayment to Contractor;
- p. Credits owed to the District for reduced scope of Work or Work that the District otherwise permits Contractor to not perform, and such credits will be based on the reasonable bid value of the unperformed Work, including markups for overhead and profit;

- q. The estimated value of performing Work deleted pursuant to Section 8-14, “Termination of Contract”;
- r. False claims by Contractor;
- s. Breach of any provision of the Contract Documents;
- t. Potential loss, liability or damages to the District that is potentially caused by the Contractor; and
- u. As permitted by other provisions in these Specifications or the Special Provisions.

The District shall provide written notice to the Contractor of items for which the District is withholding from a payment at the time that the payment is being processed. Upon request of the Contractor, it shall be given a written copy of the District’s reasons for withholding. When the grounds for withholding funds are removed, payment or release shall be made for amounts withheld because of them. No interest shall be paid on any amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

The District’s withholdings of any unpaid or unreleased amounts for costs, damages and claims by the District against the Contractor shall take priority over any third party claims against the unpaid or unreleased amounts, including stop notices.

Any overpayment to the Contractor by the District, and any failure to withhold an amount from payment that the District had the right to withhold, shall not constitute a waiver by the District of its rights to withhold for such amounts from future payments to the Contractor or to otherwise pursue those amounts from the Contractor.

For any Stop Notice enforcement action against the District filed by any of the Contractor’s subcontractors or suppliers of any tier, the Contractor shall defend and indemnify the District, its Board, officers, agents, employees, consultants, or authorized volunteers against any and all liability, loss, damages, and litigation expenses.

9-10 Final Payment

After the Contractor’s completion of performance and the District’s acceptance of the Work as provided in Section 8-15, “Acceptance of Contract”, the Engineer shall make a final estimate in writing of the amount of Work completed under the Contract and the value thereof, and provided no Notice of Potential Claim, formal claim, or Stop Notices are pending, the District will pay a sum equal to ninety (90) percent of the total value of said final estimate less the sum of all previous payments and any amounts to be withheld pursuant to Section 9-9, “Stop Notices; District’s Right to Withhold Payments”. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The final five (5) percent retention shall not be due and payable until the expiration of forty (40) calendar days from the date of recordation of the Notice of Completion by the Engineer. If the provisions of Section 9-8,

“Substitutions for Five (5) Percent Retention”, apply, the final five (5) percent retention will be released in accordance with the terms of said Section 9-8.

If, in accordance with Section 9-6, “Notice of Potential Claim”, any Notice of Potential Claim has been filed within five (5) calendar days after the Engineer’s decision not to issue a Contract Change Order or not to enter into some other form of agreement, and the related claim is filed within seven (7) calendar days following the date of issuance of a Notice of Acceptance of the Work by the Engineer as provided in said Section 8-15, or any Stop Notices remain unresolved as of seven (7) calendar days following the date of acceptance of the Contract, the Engineer will make a semi-final estimate based on undisputed work, and pay the amount thereof, less any deductions or retentions allowed or prescribed by Section 9-9, “Stop Notices; District’s Right to Withhold Payments”, within fifteen (15) calendar days following said seven (7) calendar day period. The five (5) percent retention, less any amounts to be held pending resolution of any claims or valid Stop Notices, shall be paid after the expiration of forty (40) calendar days following the date of recordation of the Notice of Completion by the Engineer as provided in said Section 8-15.

Final payments related to or resulting from claims submitted and processed in accordance with Section 9-11, “Claims” shall be made pursuant to said Section 9-11.

No certificate given or payments made under the Contract, except the final certificate or final payment, shall be evidence of the performance of the Contract, either wholly or in part, against any claim of the District, and no payment shall be construed to be an acceptance of any defective Work or improper materials.

Payment of the final amount due under the Contract, and the adjustment and payment for any Work done in accordance with any alterations of the same, shall release the District, its Board, and the Engineer from any and all claims or liability on account of Work performed under the Contract or any alteration thereof.

9-11 Claims

A claim will not be considered unless a Notice of Potential Claim is submitted in accordance with Section 9-6, “Notice of Potential Claim”. Claims shall be submitted by the Contractor and processed by the District in accordance with Article 1.5, “Resolution of Construction Claims”, of Chapter 1 of Part 3, “Contracting by Local Agencies”, of Division 2 of the Public Contract Code, and as provided in this Section 9-11.

9-11.01 Claims Submittal

All claims shall be submitted in writing no later than seven (7) calendar days following the date of issuance of the Notice of Acceptance by the Engineer of the total Work required by the Contract, as provided in Section 8-15, “Acceptance of the Contract”. Any claims filed by the Contractor shall be in sufficient detail and with sufficient documentation to enable the Engineer to ascertain the basis and amount of said claims.

9-11.02 Claims Less Than \$50,000

For claims of less than fifty thousand (50,000) dollars, the Engineer shall respond in writing to any written claim within forty-five (45) calendar days of receipt of the claim, or may request, in writing, within thirty (30) calendar days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor. Failure to provide the additional documentation will be sufficient cause to deny the claim.

The District's written response to such claim of less than fifty thousand (50,000) dollars, as further documented, shall be submitted to the Contractor within fifteen (15) calendar days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor in producing the documentation, whichever is greater.

9-11.03 Claims of \$50,000 to \$375,000

For claims of fifty thousand (50,000) dollars or more but less than or equal to three hundred seventy five thousand (375,000) dollars, the District shall respond, in writing, within sixty (60) calendar days of receipt of the claim, or may request, in writing, within thirty (30) calendar days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor. Failure to provide the additional documentation will be sufficient cause to deny the claim.

The District's written response to such claim of fifty thousand (50,000) dollars or more but less than or equal to three hundred seventy five thousand (375,000) dollars, as further documented, shall be submitted to the Contractor within thirty (30) calendar days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

9-11.04 Claims Greater Than \$375,000

For claims greater than three hundred seventy five thousand (375,000) dollars, the District shall respond, in writing, within ninety (90) calendar days of receipt of the claim, or may request, in writing, within forty five (45) calendar days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the District may have against the Contractor. Failure to provide the additional documentation will be sufficient cause to deny the claim.

The District's written response to such claims greater than three hundred seventy five thousand (375,000) dollars, as further documented, shall be submitted to the Contractor within forty five (45) calendar days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

9-11.05 Meet and Confer Request

If the Contractor disputes the District's written response to the claim, or the District fails to respond within the time prescribed, the Contractor may notify the District, in writing, either within fifteen (15) calendar days of receipt of the District's response, or within fifteen (15) calendar days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon demand, the District shall schedule a meet and confer conference within thirty (30) calendar days for settlement of the dispute.

If no demand for a meet and confer conference is made within the time period as above prescribed, the Engineer shall make a final determination as to the disposition of the claim or other unresolved matters and make adjustments, if any, to the semi-final estimate which shall then be deemed the final estimate, and the District shall pay the amount thereof after the expiration of fifteen (15) calendar days following the District's response as provided in Sections 9-11.02, "Claims Less Than "\$50,000", through 9-11.04, "Claims Greater than \$375,000". If no valid Stop Notices remain unresolved, any unpaid portion of the five (5) percent retention will be released but no sooner than forty (40) calendar days from the date of recording the Notice of Completion as provided in Section 8-15, "Acceptance of the Contract". If the provisions of Section 9-8, "Substitutions for Five (5) Percent Retention", apply, any unpaid portion of the five (5) percent retention will be released in accordance with the terms of said Section 9-8.

9-11.06 Claim Final Determination

If demand is made for a meet and confer conference, and the claim or any portions remain in dispute following said conference, the Engineer shall make a final determination as to the disposition of the claim or other unresolved matters and make adjustments, if any, to the semi-final estimate, which shall then be deemed by the District to be the final estimate. Written notice and payment thereof shall be made within fifteen (15) calendar days following the meet and confer conference. Release of any unpaid portion of the five (5) percent retention will be made as provided in Section 9-11.05, "Meet and Confer Request".

9-11.07 Government Code Formal Claim

If the Contractor further disputes the final determination of the claim and any adjustments by the Engineer as provided in Section 9-11.06 "Claim Final Determination", the Contractor may file a formal claim against the District as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code, using the District's formal claims process. For purposes of those provisions, the running of the period of time within which a formal claim must be filed shall be tolled from the time the Contractor submits its written claim pursuant to Section 9-11.01, "Claims Submittal", until the time that claim or portion thereof is denied as a result of the meet and confer process provided in Section 9-11.05, "Meet and Confer Request", including any period of time utilized by the meet and confer process.

9-11.08 Support For Arbitration Award

If any claim or dispute is arbitrated, the arbitrator's award shall be supported by law and substantial evidence.

9-11.09 Each Party To Bear Costs of Arbitration Or Litigation

Except as expressly and specifically (i) set forth in Section 7-12, "Defense and Indemnification", and the Contract Documents including, but not limited to, the Contract Payment and Performance Bonds required pursuant to Section 3-5, "Contractor's Bonds", or (ii) authorized by law, no party to arbitration or litigation shall recover from the other party any attorneys or expert witness fees or other costs associated with or arising out of any proceedings filed, instituted in connection with, or arising out of the Contract Documents, or the performance of any part thereunder.

SECTION 10 – UNDERGROUND UTILITIES

10-1 Underground Utility Locations, Markout

Reference is made to Section 8-6, “Underground Utilities Markout”. As required by Government Code Section 4216.2, at least two (2) working days before entering on the Work site, the Contractor shall notify the Underground Service Alert (USA) Regional Notification Center of the Work to be performed under the Contract and its location, and request that all utility owners having a possible interest in the Work area to mark or otherwise indicate the location of their underground utility facilities. No work shall proceed until all utility owners have identified and marked the location of their respective facilities. Utility as herein used shall have the meaning as specified in Section 1-42, “Utility”.

The Contractor shall ascertain by potholing or other means the exact location of underground mains or trunklines whose presence are indicated on the Plans or in the Special Provisions, the location of their service laterals, or other appurtenances of any other underground facilities which can be inferred from the presence of visible facilities such as buildings, meters and junction boxes, prior to doing Work that may damage any of the facilities or interfere with their service. The Contractor shall familiarize itself with the type, material age, and condition of any utility which may be affected by the Work.

If the Contractor cannot locate an underground facility whose presence is indicated on the Plans or in the Special Provisions, the Contractor shall immediately notify the Engineer in writing. If the facility for which the notice is given is found to be in a substantially different location from that indicated on the Plans or in the Special Provisions, the additional cost for locating the facility shall be paid for as Extra Work in accordance with Section 4-4, “Extra Work”, and Section 9-5, “Payment for Extra Work”.

The cost of verifying the locations of said underground utility facilities indicated on the Plans, including exposing them prior to construction, shall be considered as being included in the various bid items of Work and no additional payment will be made therefor.

10-2 Utility Facilities Not Shown on Plans; Mains and Trunklines

Reference is made to Section 4215 of the California Government Code. The Contractor’s attention is directed to the possible existence of underground utility main or trunkline facilities not indicated on the Plans or in the Special Provisions, and to the possibility that utility mains or trunklines may be in a location different from that which is indicated on the Plans or in the Special Provisions. If the Contractor discovers utilities not identified or in a location different than that shown on the Plans or specified in the Special Provisions, the Contractor shall immediately notify the Engineer and the utility owner in writing of such discovery, and request a determination on the disposition of such utilities.

If a utility is damaged in the discovery process, the Contractor will be compensated for the costs of (i) repairing damage not due to its failure to exercise reasonable care, due diligence, and caution in the performance of the Work, and (ii) removing or relocating interfering main or trunk-line utility facilities when such facilities are not indicated on the Plans or in the Special Provisions with reasonable accuracy. Said compensation will be paid for as “Extra Work” in

accordance with Sections 4-4, "Extra Work", and 9-5, "Payment for Extra Work", of these Specifications.

The repair, relocation, or removal of such facilities shall be done by the Contractor in cooperation with the owners of such utilities; provided that the owner may direct that the relocation be done by the owner's forces. In such a case, the Contractor shall cooperate fully in completing the Work.

In lieu of relocating a utility not shown on the Plans as indicated above, the Engineer may direct that the storm drain facility be shifted in elevation to avoid the conflict. In such a case, the additional work resulting therefrom, if any, shall be classed as Extra Work and the increase in compensation will be paid for as specified above, except for increases in depth of eighteen (18) inches or less, in which case no additional compensation will be paid. Reference is made to Section 14-3, "Trench and Structure Excavation".

10-3 Protection

It is anticipated that storm drain pipelines will cross under or over such utility facilities and service lines as indicated on the Plans or in the Special Provisions. As required by the Construction Safety Orders contained in the California Code of Regulations, Title 8, Division 1, the Contractor is responsible for the safeguarding and protection of all utility facilities and services within the limits of the Work.

A diligent effort has been made by the District to locate and indicate on the Plans, as accurately as possible, the location of all known main or trunk-line utility facilities within the Work area, but the Contractor is responsible for further checking and verifying in the field their locations, as provided in Section 10-1, "Underground Utility Locations, Markout". As specified in Section 10-2, "Utility Facilities Not Shown on the Plans; Mains and Trunklines", the Contractor is further responsible for exercising due caution in anticipation of any and all utilities whose presence or locations are unknown.

Except as otherwise provided herein, all utility facilities and services damaged or broken by the Contractor shall be repaired or replaced at its sole cost and expense in accordance with the requirements of the owner of said utility and as specified in this Section 10. No additional payment will be made therefor. The Contractor shall immediately notify the Engineer and the utility owner if it disturbs, disconnects, or damages any utility.

As required by Section 7-10, "Permits, Licenses, and Fees", prior to the commencement of the Work, the Contractor shall obtain a permit from the jurisdictional agency in which the Project is located. In cooperation with the Engineer and the agency representative, the Contractor shall arrange for an inspection of each sanitary sewer house branch in the path of the proposed Work that is to be interrupted. The Contractor may be permitted to sever a sanitary sewer house branch, provided an approved temporary conduit for the missing portion is installed immediately. The installation of the permanent sanitary sewer house branch shall comply in all respects with all the agency specifications and conditions, and shall be inspected by the agency and the Engineer prior to backfilling.

The full cost of protection, repair, or replacement of utilities, except as otherwise provided herein, shall be included in the various bid items of Work and no additional payment will be made therefor.

10-4 Relocation

Wherever it is shown on the Plans or indicated in the Special Provisions that water, sewer, gas or other utility facilities or structures are to be relocated, such Work shall be done by the Contractor in cooperation with the owners of such utilities; provided that the owner of such facility may direct that the relocation be done by the owner's forces. In such a case, the Contractor shall cooperate fully in completing the relocation. Unless otherwise specified in the Special Provisions, the cost for relocation of the utility facilities by the Contractor, or by the owner if such cost is to be borne by the Contractor, shall be included in the various Contract items of Work, and no additional payment will be made therefor.

Should the Contractor desire to have any relocation made of any utility facility, or other improvement, for its convenience in order to facilitate its construction operations, which relocation is in addition to or different from the relocations indicated on the Plans or in the Special Provisions, it shall make whatever arrangements are necessary with the owner of such utility for such relocation and bear all expenses in connection therewith.

10-5 Utility Conflicts

In the performance of locating underground utility facilities as required by Section 10-1 "Underground Utility Locations, Markouts", should the location of an underground utility be discovered to be in conflict with the proposed Work, or if an unknown utility is found during excavation to be in conflict, the Contractor may be required by the Engineer to proceed to other areas of the Work until such time as conflicts with the utility can be resolved. No additional compensation will be paid for the cost of moving the operations.

10-6 Limitations of District Liability

Except for the assumption of liability as may be required by statute and such liabilities assumed in accordance with Section 10-2 "Utility Facilities Not Shown on Plans; Mains and Trunklines", the District shall have no responsibility or liability in respect to the sufficiency or accuracy of the information or investigation of the location of utility facilities made by it, or in respect to the actual or apparent location of all known utility facilities as indicated on the Plans or in the Special Provisions, or in respect to unlooked-for developments which may occur as to the location of such utility facilities, or in respect to utility facilities which may be encountered at places different from that indicated.

SECTION 11 – REINFORCEMENT

11-1 General

This work shall consist of furnishing and placing steel reinforcement of the shape and dimensions shown on the Plans and as specified in these Specifications and the Special Provisions.

11-2 Materials

Bar reinforcement and welded wire fabric shall conform to the following requirements:

11-2.01 Bar Reinforcement

Bar reinforcement shall conform to the specifications of ASTM Designation A-615, Grades 40 or 60. The various grades shall not be used interchangeably.

11-2.02 Welded Wire Fabric

Welded Wire Fabric shall conform to the specifications of ASTM Designation A-185A. The gage of the wire and dimensions of the mesh shall be as shown on the Plans or specified in the Special Provisions.

11-3 Cleaning

Before concrete is placed, the reinforcement to be imbedded shall be free of mortar, oil, dirt, excessive mill scale and loose rust, and other coatings of any character that would destroy or reduce the bond.

11-4 Bending

Reinforcement shall conform accurately to the dimensions shown on the plans. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or improper bends shall not be used.

11-5 Placing

Before placing bar reinforcement, when required by the Special Provisions or the Engineer, the Contractor shall furnish shop drawings showing reinforcement details to the Engineer for approval. The reinforcing bars shall be placed as shown on the approved reinforcement details and as shown on the Plans. Reinforcement shall be firmly and securely held in position by wiring at intersections and splices and by using pre-cast mortar blocks or ferrous metal chairs, spacers, metal hangers, and other approved devices of sufficient strength to resist crushing under applied loads. Tack welding on reinforcing bars will not be permitted.

Reinforcement shall have a clear coverage of two (2) inches except as otherwise shown on the Plans or specified in the Special Provisions. If ordered by the Engineer, additional coverage shall be provided. Clear coverage shall be measured from the surface of the concrete to the outside of the reinforcement. Placing bars on layers of fresh concrete as the work progresses will not be permitted.

Welded wire fabric shall be rolled flat before placing concrete, unless otherwise shown on the Plans. Welded wire fabric shall be firmly held in place against vertical or transverse movement by means of devices satisfactory to the Engineer.

11-6 Splicing

Splicing of bar reinforcement shall be done in accordance with Section 52-1.08, "Splicing", of the Caltrans Standard Specifications, latest edition.

11-7 Inspection

No concrete shall be placed until the Engineer has inspected the reinforcement placement and has authorized the pouring of concrete.

11-8 Measurement and Payment

Unless otherwise provided in the Special Provisions, no separate measurement of Reinforcement will be made. The cost of furnishing and placing Reinforcement shall be included in the price bid for the various structures requiring reinforcement; and no additional payment will be made therefor.

SECTION 12 - PORTLAND CEMENT CONCRETE; CEMENT MORTAR**12-1 General**

Portland Cement Concrete shall be composed of cement, fine aggregate, coarse aggregate, admixtures if specified, and water, proportioned and mixed as herein specified. Cement content for the listed classes of concrete shall be as follows:

Class A - Concrete shall contain 564 pounds (6 sacks) of cement per cubic yard.

Class B - Concrete shall contain 470 pounds (5 sacks) of cement per cubic yard.

Unless otherwise specified in the Special Provisions, the class and minimum compressive strength of concrete shall be as required in these Specifications for the items of work requiring Portland Cement Concrete.

Cement Mortar shall comply with the requirements of Section 12-8, "Cement Mortar".

Slurry Cement Backfill shall conform to Section 15-2.03, "Slurry Cement Backfill".

12-2 Materials

The materials for manufacturing Portland Cement Concrete and Cement Mortar shall conform to the following requirements:

12-2.01 Cement

Cement used in the manufacture of concrete or mortar, including cement used in precast products, or Slurry Cement Backfill, shall be Type II Portland Cement conforming to the specifications of ASTM Designation: C150, latest edition, unless otherwise specified in the Special Provisions.

Any reference in these Specifications to a "sack" of cement refers to a 94 lb sack or bag of Portland Cement.

The Contractor shall make arrangements with the manufacturer of ready-mixed concrete, or pre-cast products to provide adequate facilities to assure that cement meeting the requirements specified herein will be kept separate from other cement in order to prevent any but the specified cement entering the Work.

All cement not conforming to these Specifications or the Special Provisions, and all cement damaged or contaminated, shall be removed immediately and not used in the Work.

12-2.02 Water

Water for washing aggregates and for mixing with concrete or mortar shall be free from oil and shall not contain other impurities in a sufficient amount to cause a significant change in the true setting time of the concrete, reduction in the concrete compressive strength, discoloration of the concrete, or produce etching of the concrete or mortar surface. The

quantity of water used for manufacturing concrete shall comply with Section 12-3, "Amount of Water and Slump Test".

12-2.03 Coarse Aggregate

Coarse aggregate for use in manufacturing Portland Cement Concrete shall consist of gravel, crushed gravel, crushed rock, or combination thereof. It shall be free from deleterious coatings, roots, barks, sticks, rags and other extraneous material. Regardless of source, all coarse aggregate shall be thoroughly and uniformly washed before use. Coarse aggregate when sampled at the batching bin shall have a Cleanness Value of not less than 75 when subjected to the cleanness test performed in accordance with California Department of Transportation (Caltrans) California Test 227.

Coarse aggregates shall be furnished in the following sizes determined in accordance with ASTM Test Designation: C136, as follows:

<u>Sieve</u> <u>Mesh Size</u>	<u>Size of Aggregate</u>		
	1-1/2" to #4 Percent Passing	1" to #4 Percent Passing	3/4" to #4 Percent Passing
2"	100		
1-1/2"	90 - 100	100	
1"	20 - 55	90 - 100	100
3/4"	0 - 15	60 - 85	90 - 100
3/8"	10 - 30	15 - 40	20 - 55
#4	0 - 5	0 - 10	0 - 10

The maximum size of coarse aggregate shall be as required in these Specifications for the items of Work requiring Portland Cement Concrete or as otherwise specified in the Special Provisions.

Coarse aggregate, when tested for soundness in conformance with the requirements in Caltrans California Test 214, shall lose not more than ten (10) per cent by weight.

12-2.04 Fine Aggregate

Fine aggregate for use in manufacturing Portland Cement Concrete shall be natural sand, sand manufactured from larger aggregate, or a combination thereof. The aggregate shall be of such character that makes possible the production of a workable concrete within the limits of water content provided in Section 12- 3, "Amount of Water and Slump Test". It shall be free from deleterious coatings, roots, barks, sticks, rags and other extraneous material.

When testing for organic impurities in accordance with the test method of ASTM Designation: C40, fine aggregate shall not indicate a color darker than the reference standard color solution unless it is determined by the Engineer that a darker color is acceptable. When tested for soundness in conformance with the requirements in Caltrans California Test 214, fine aggregate shall not have more than ten (10) percent loss by weight.

Fine aggregate shall be well-graded and shall range in size uniformly within the following limits when tested in accordance with ASTM test method Designation: C136.

Sieve Mesh Size	Percent Passing
3/8"	100
#4	90 - 100
#8	65 - 90
#16	45 - 75
#30	20 - 45
#50	10 - 20
#100	0 - 8
#200	0 - 3

The fine aggregate shall contain not more than three (3) percent by weight of material passing the number two hundred (#200) mesh screen when tested in accordance with the test method of ASTM Designation: C136.

12-2.05 Ready-mixed Concrete

Materials used in the production of Ready-mixed Concrete shall comply with all of the requirements of this Section 12. The maximum size of coarse aggregate and gradation of all aggregate shall be as required in these Specifications or as specified in the Special Provisions for the items of work requiring Portland Cement Concrete.

Ready-mixed concrete delivered to the job site of the Work shall be discharged within one and one-half (1½) hours after the addition of water to the cement and aggregates, or before the drum has been revolved two hundred fifty (250) revolutions, whichever comes first. In hot weather or under conditions contributing to quick stiffening of the concrete, the time between the introduction of water to the cement and aggregates and discharge shall be less

than one and one-half (1½) hours, as directed by the Engineer, except that concrete shall not be discharged once the temperature of the concrete has reached eighty-five (85) degrees F or above.

Should water be added at the job site, the drum shall be revolved a minimum of thirty (30) revolutions after the introduction of such water and before discharge is commenced.

12-2.06 Admixtures

No admixture shall be used without written permission from the Engineer or unless elsewhere provided for in these Specifications or in the Special Provisions for the items of Work requiring Portland Cement Concrete or Cement Mortar. Admixtures may include, but are not limited to, Calcium Chloride, various air entrainment agents, and Fly Ash.

12-2.06.1 Calcium Chloride

When the use of calcium chloride is permitted by the Engineer, or is specified in the Special Provisions, the calcium chloride shall conform to the specifications of ASTM Designation: D98. The quantity used shall not exceed the permitted or specified amount. If no dosage is specified, the admixture shall be used at the dosage usually recommended by the manufacturer of the admixture.

12-2.06.2 Air-Entraining Agent

When the use of an air-entraining agent is permitted, or is specified in the Special Provisions, it shall be added at the rate designated by the Engineer to result in an air content of from three (3) to six (6) percent by volume, as determined by Caltrans California Test 504, in the freshly mixed concrete.

12-2.06.3 Fly Ash

When the use of fly ash is permitted by the Engineer, or is specified in the Special Provisions, the fly ash shall conform to ASTM Designation: C618. When specified or approved for use as a cement replacement, the remaining cement shall be no less than seventy five (75) percent by weight of the specified minimum cementitious material content. The actual quantity used shall not exceed the permitted or specified amount.

12-3 Amount of Water and Slump Test

The amount of water required for the proper consistency of concrete shall be determined by means of a Slump Test made in accordance with the Standard Test Method for Slump of Portland Cement Concrete, ASTM Designation C143. The amount of slump shall be measured as twelve (12) inches minus the height (in inches) of the concrete test sample after subsidence. The allowance for slump shall be as follows:

Cast-in-Place Pipe & Concrete Paving	Not more than 3 inches
All Concrete Structures	Not more than 3 inches
Concrete Curbs, Gutters & Sidewalks	Not more than 5 inches

Batches of concrete with a slump exceeding the maximum values listed shall not be used in the Work.

The amount of water used in the manufacture of Portland Cement Concrete shall not exceed six and one-half (6½) gallons, including moisture in the aggregate, per sack of cement for Class A concrete, and seven (7) gallons per sack of cement for Class B concrete.

12-4 Placing and Protecting Concrete

Placing of concrete shall follow best construction practices, including the use of vibratory equipment as appropriate and as required by Section 12-7, "Vibrators", which result in a dense, un-segregated mixture completely filling the space intended to receive concrete, free of voids or surface irregularities. No concrete shall be placed on ground surfaces which have not been properly prepared and compacted, or against forms which are not true to lines and grades and adequately supported. In all cases, concrete shall not be placed without the Engineer's approval as to suitability of the supporting subsurface or forms, or as to other conditions as described in this Section 12-4.

Concrete for structures shall not be placed on frozen ground nor shall it be mixed or placed while the atmospheric temperature is below thirty-five (35) degrees F, unless adequate means are employed to heat the aggregates and water, and satisfactory provision has been made for protecting the concrete. Provisions satisfactory to the Engineer shall be taken to protect concrete about to be poured when there is danger of temperature dropping below thirty-five (35) degrees F within the next twenty-four (24) hours. Concrete damaged by frost action shall be replaced by the Contractor at its expense.

Placing of concrete under rainy conditions shall be stopped before the quantity of surface water is sufficient to damage the surface mortar or cause a flow or wash of the concrete surface, unless the contractor provides adequate protection against damage.

Concrete shall not be placed when the air temperature in the shade in the vicinity of the Work exceeds ninety-five (95) degrees F, or when the temperature of the concrete exceeds eighty-five (85) degrees F.

All surfaces against which concrete is to be placed shall be free from standing water, mud, and debris, and shall be firm enough to prevent contamination of the concrete by earth or other foreign material.

Absorptive surfaces against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

12-5 Forms

Forms shall be smooth, mortar tight, true to the required lines and grades, and of sufficient strength to resist springing out of shape during the placing of the concrete. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt,

mortar, and foreign matter before being re-used. Before concrete is placed in forms, all surfaces against which the concrete will be placed shall be thoroughly coated with form oil.

Prior to placing concrete, the Contractor shall have all forms checked by the Engineer for alignment and grade.

12-6 Curing Concrete

Immediately after finishing, the exposed exterior surfaces of the concrete shall be cured by either the water method, pigmented curing compound method, or the waterproof membrane method, in accordance with Section 90-7, "Curing Concrete", of the Caltrans Standard Specifications, except that for cast-in-place concrete pipe, only the waterproof membrane method shall be used, as provided in Section 19-10, "Curing", of these Specifications.

12-7 Vibrators

Reference is made to Section 12-4, "Placing and Protecting Concrete". Whenever a structure requiring reinforcement is to be constructed, the Contractor shall provide one or more portable vibrating machines to be used in the placement of concrete within the forms for such structures, as directed by the Engineer. Full compensation for providing vibrating machines shall be considered as being included in the various bid items of work and no additional payment will be made therefor.

12-8 Cement Mortar

Materials used in the Manufacture of Cement Mortar shall comply with the applicable provisions of Section 12-2, "Materials". Cement mortar shall be composed of one part Portland Cement and two parts of clean, well-graded sand of such size that all will pass a No. 8 sieve. An admixture of hydrated lime, fire clay or diatomaceous earth may be used in the mortar to facilitate workability; the amount of such material used will be limited as ordered by the Engineer. Mortar shall be used within thirty (30) minutes after the mixing water has been added to the dry ingredients.

Reference is made to Section 17, "Reinforced Concrete Pipe (RCP)". For use in concrete pipe joints, the consistency of laying mortar shall be such as to adhere to the ends of the pipe while it is being laid and be easily squeezed out of the joint when the pipe sections are squeezed together. Mortar used for jointing and exterior joint banding shall be of such consistency that it will readily adhere to the pipe. Quick setting cement may be used for manufacturing Cement Mortar when necessary to facilitate the early backfilling of the trench.

12-9 Certificate of Compliance; Samples

The Contractor and its suppliers shall comply with the provisions of Section 6-3, "Samples and Tests", and Section 6-5, "Certificates of Compliance". When required by the Engineer, the Contractor shall furnish certificates certifying that the Portland Cement Concrete furnished for the Work complies in all respects with the provisions of this Section 12 and any other provisions as may be specified in the items of Work requiring Portland Cement Concrete or as may be specified in the Special Provisions. For pre-cast concrete structures used in the Work, the Contractor shall, when required by the Engineer, furnish certificates of compliance stating that the concrete used in the manufacture of the structures complies in all respects with this Section

12 and any other provisions as may be specified in the items of Work requiring Portland Cement Concrete or as may be specified in the Special Provisions.

The Contractor shall also provide safe and ready access to suppliers' facilities for testing personnel to obtain samples of the various materials used in the manufacture of Portland Cement Concrete to be used for compliance testing.

12-10 Measurement and Payment

Unless otherwise provided in the Special Provisions, the cost for providing Portland Cement Concrete or Cement Mortar shall be included in the various Contract items of Work requiring concrete or mortar and no additional payment will be made therefor. All costs shall include the cost for furnishing certificates of compliance, samples, and any tests consistent with this Section 12 as may be ordered by the Engineer or required by these Specifications or the Special Provisions for the various Contract items of Work requiring Portland Cement Concrete or Cement Mortar.

SECTION 13 - CLEARING AND GRUBBING

13-1 General

This Work shall consist of furnishing all the labor, equipment, materials and incidentals required in removing all objectionable material along and within the Work site of pipeline construction, from retention basin excavation or embankment areas, along the Work site of fence construction, or any other areas designated on the Plans or in the Special Provisions to be Cleared and Grubbed. Clearing and Grubbing operations shall be performed in advance of construction operations and in accordance with these Specifications.

13-2 Protection of Existing Improvements

The Contractor shall comply with the provisions of Section 7-23, "Protection and Restoration of Existing Improvements". Only those items or areas designated or marked shall be removed or cleared. Trees, vegetable growth, or any other existing improvements that are designated not to be removed shall be protected from damage in accordance with said Section 7-23.

13-3 Construction

The contractor shall remove and dispose of all pavement or other surfacing, vegetable growth such as brush, trees, stumps, roots, weeds, and grass, and all rubbish, debris, or other improvements or structures such as, but not limited to, existing manholes or inlets, drain wells, headwalls, septic tanks or leach fields, or irrigation pipes, from the Work site or other areas designated to be cleared and grubbed. No such material will be allowed in or under backfill material or embankments unless specifically shown on the Plans or specified in the Special Provisions.

Railroad facilities such as ties and rails are to be removed where shown on the Plans or specified in the Special Provisions for such removal. The Contractor shall make arrangements for forces qualified for identification, removal and disposal of any or all of the railroad facilities to be removed deemed to be hazardous. Any hazardous materials so removed are to be disposed of in accordance with Section 7-20, "Trenches and Excavations – Hazardous Waste" and Section 7-31, "Disposal of Material". The Contractor shall include the cost for removal and disposal of non-hazardous railroad facilities, and the cost for identification, removal, and disposal of any hazardous material by qualified forces, in the price bid for Clearing and Grubbing and no additional payment will be made therefor.

Railroad facilities, including rails and ties, not shown on the plans or specified in the Special Provisions for removal, but encountered during excavation for the Work, shall be handled in compliance with said Section 7-20.

Water wells to be removed shall be abandoned in accordance with State of California Bulletin 74-81, Water Well Standards, as amended by Bulletin 74-90, Fresno County Health Department Regulations. The Contractor performing the well abandonment shall be licensed to perform such work (Class A or Class C-57) in accordance with the provisions of the State Business and Professions Code, Chapter 9, Division 3. The Contractor shall obtain at its expense the necessary permits to perform the abandonment.

Where a portion of an existing concrete facility is to be removed, it shall be saw-cut to a minimum depth of 1½ inches at the first scoring line at or outside the planned joint and removed without damage to any portion that is to remain. If curbs and gutters cannot be cut off square and neat, the entire curb and gutter shall be removed to the nearest weakened plane or expansion joint. Where steel reinforcement is encountered, such as in valley gutters, at least 6 inches of the reinforcement shall be retained outside the cut edge to provide a tie for new reinforcement.

Removal of portions of existing asphalt concrete shall be performed as shown on the Plans or specified in the Special Provisions or Encroachment Permit issued by the jurisdictional agency.

Disposal of material shall comply with the requirements of Section 7-20, "Trenches and Excavations – Hazardous Waste", and Section 7-31, "Disposal of Material".

13-4 Payment

Where a Contract pay item is provided, Clearing and Grubbing will be paid for on a lump-sum basis at the price bid therefor. Where no Contract pay item is provided, the cost for Clearing and Grubbing shall be included in the various Contract items requiring Clearing and Grubbing and no additional payment will be made therefor

The lump-sum price paid for Clearing and Grubbing, or the price paid when the cost thereof is included with other Contract items, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Clearing and Grubbing as shown on the Plans, as specified in these Specifications, the Special Provisions, or Encroachment or Well Abandonment Permits issued by the jurisdictional agency including the cost of such permits, and as directed by the Engineer, including the removal and disposal of all the resulting material.

SECTION 14 - TRENCH AND STRUCTURE EXCAVATION, RETENTION BASIN EXCAVATION AND GRADING**14-1 General**

This Work shall consist of furnishing all labor, equipment, materials and incidentals required for the performance of all excavation necessary or required for the construction of pipelines, structures, retention basins, and related facilities required for the collection, transportation, and storage of storm water runoff, all as shown on the Plans and specified in the Special Provisions and these Specifications, and as directed by the Engineer.

The District makes no guarantee as to the types of soil or of soil conditions existing within the project limits. In accordance with Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract, Documents, and Site of Work", and Section 2-5, "Pre-bid Tests," prior to submitting a bid proposal, the Contractor shall have performed any soils or other tests it deemed necessary to make itself fully aware of the soil types or conditions which may prevail throughout the project site, and the effects it may have on Trench and Structure Excavation and Retention Basin Excavation and Grading and the various related bid items. Where the District has conducted soils investigations and has made such report available to prospective Bidders, the data provided therein is for the Contractor's information and convenience only. No representation is made thereby as to the conditions to be encountered in performing any excavation or grading shown on the Plans or specified in the Special Provisions.

The Contractor shall comply with all of the provisions of Section 10, "Underground Utilities", before commencing and during any excavation or grading. In addition, all excavations shall be made in compliance with Section 7-18, "Worker Protection From Caving Ground in Excavations", Section 7-19, "Worker Protection From Toxic or Explosive Gases; Confined Spaces Entry", Section 7-20, "Trenches and Excavations-Hazardous Waste", Section 7-21, "Protection of Archeological, Cultural, Paleontological Resources", the Construction Safety Orders issued by the Division of Industrial Safety of the California Department of Industrial Relations, and the permit issued by the Division of Occupational Safety and Health (Cal OSHA).

14-2 Permits

In accordance with Section 7-10, "Permits, Licenses, and Fees", the Contractor shall obtain at its expense an Encroachment Permit from the applicable jurisdictional agency (City of Fresno, County of Fresno, City of Clovis, Caltrans), and an Excavation Permit from the State Division of Occupational Safety and Health (Cal OSHA) where such permit is required, or any other permit that may be required by the Work or as required by law, prior to commencing any excavation within any street, easement, or retention basin.

14-3 Trench and Structure Excavation

Reference is made to Section 7-23, "Protection and Restoration of Existing Improvements", and to Section 10-1, "Underground Utility Locations, Markouts". Excavations shall be made to the depths and widths required to accommodate construction of pipelines and structures to specified dimensions, and to the lines and grades indicated on the Plans, except that pipe laterals shall be installed at the depth and grade specified by the Engineer after exposing existing intersecting utilities by the Contractor. The Contractor shall allow in its bid price for the various lateral pipe

installation quantities full compensation for any increase or decrease in anticipated depth of trench because of the location of intersecting utilities, whether shown on the plans or not. Laterals, as herein used, shall be taken to mean the pipeline which is installed to connect a storm drain inlet to the main storm drain, either directly or at a manhole.

Reference is made to Section 10-2, "Utility Facilities Not Shown on Plans; Mains and Trunklines". Where conflicts arise between utilities and the planned location of storm drain mains or structures, as specified in said Section 10-2 in lieu of relocating a utility not shown on the Plans or is shown in a different location, the Engineer may direct that the storm drain main or structure be shifted in location or elevation, or both. In such a case, for increases in depth greater than eighteen (18) inches, the additional work resulting therefrom, if any, shall be classed as Extra Work and the increase in cost will be paid for as specified in Section 4-4, "Extra Work". No additional payment will be made for increases in depth of eighteen (18) inches or less.

When a trench or structure excavation site is to be located in an existing paved area, the existing paving to be removed, whether by excavation or grinding where specified, shall be cut by methods approved by the Engineer along neat lines on each side of the trench or around the structure site. Reference is made to the Standard Plans, Drawing No. G-1 "Trench Excavation, Backfill, Surface Restoration". Before final paving is placed, the edge of additional pavement shall be ground and repaved to the limits required by the Plans or pursuant to said Standard Plan. The amount shown is minimum; the jurisdictional agency may require different widths or thicknesses to be ground and repaved. The more restrictive requirements of the jurisdictional agency or the Standard Plan shall apply, as determined by the Engineer. In accordance with Section 8-5.01, "Surfacing Removal", the existing asphalt concrete or other surfacing at any location shall be removed from proposed trench areas or structure excavation sites no sooner than forty-eight (48) hours prior to excavation at that location. No asphalt concrete or other surfacing shall be removed on a Friday or the day before a legal holiday unless excavation and follow-up work will occur the same day. Where asphalt concrete or other surfacing is to be removed by grinding, and the remaining surfacing is suitable for maintaining traffic use as determined by the jurisdictional agency and the Engineer, such grinding may proceed at an earlier time as approved by the Engineer in writing.

Existing paving or any other deleterious material, when removed, shall be kept separated from the material which is to be returned to the excavation. Paving material that is removed by grinding and is to be later used in the backfill or structural section shall be stored in a manner as to prevent contamination. Failure to comply with these requirements shall be grounds for rejection of the material for use as backfill or for the structural section.

Reference is made to Section 8-5.02, "Open Trench/Structure Excavation Time Limits". Structures and pipes shall be constructed or placed as soon as practicable after excavation, but in no case shall a trench be excavated more than one (1) calendar day before pipe construction. No trench shall be excavated on a Friday or the day before a legal holiday that is not to receive pipe on the same day, all in accordance with said Section 8-5.02. These requirements may be modified by the Engineer, under certain unusual circumstances, to allow up to a maximum trench length of one hundred fifty (150) feet to be left open for a length of time greater than one (1) calendar day (as specified by the Engineer), provided that access to affected properties can

adequately and safely be provided and maintained, and the trench is properly barricaded and suitably marked. In locations where the trench is allowed to be left open for extended periods (i.e. Holiday Weekends), the Contractor may also be required by the Engineer to furnish and install steel trench plating for access, traffic, or safety reasons at locations determined by the Engineer, with no additional payment made therefor. The time limits provided in this paragraph shall also apply to structure excavation sites, except that the time-lag between excavation and construction shall apply to the time between excavation of the site and the commencement of placing concrete forms for cast-in-place structures, or placing pre-cast structures where permitted. New manholes constructed in-line with new pipelines shall use the same time limits applied to the pipeline.

Trenches for pre-cast pipe or excavations for structures shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe or bottom of the structure. Reference is made to the specific excavation and bedding requirements in these Specifications for each type of precast pipe specified.

Trenches for cast-in-place pipe shall be graded and prepared to provide full, firm and uniform support by undisturbed earth or compacted fill throughout the bottom two hundred twenty (220) degrees of the pipe periphery.

For pre-cast pipe trenches, if rock, hardpan or like materials are encountered, the trench shall be over-excavated to a minimum depth of four (4) inches below the grade of the bottom of the pipe. The space shall be backfilled with suitable material complying with the bedding material requirements specified in these Specifications for the type of pipe installed and shall contain sufficient moisture to produce maximum compaction. The imported earth shall be compacted to the satisfaction of the Engineer, and finish graded to the original lines and grades as provided above for pre-cast and cast-in-place pipe. No additional payment will be made for such excavation or bedding backfill.

In all trenches or structure sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, the material shall be removed to a minimum of twelve (12) inches, or to such other depth determined by the Engineer, below the bottom of the pipe or structure, and the space backfilled with suitable material containing sufficient moisture to produce maximum compaction. The backfill material shall be free from lumps or other unsuitable material, and when compacted to the satisfaction of the Engineer, shall be finish graded as provided above for pre-cast and cast-in-place pipe, or as required by the Engineer for structures. No additional payment will be made for such additional excavation or backfill.

All existing gas lines, water lines, conduits, sewers, drains, fire hydrants, and other structures which are not, in the opinion of the Engineer, required to be changed in location shall be carefully supported and protected from damage by the Contractor, and in case of damage, shall be restored by it, without additional compensation, to as good a condition as that in which they were found to the satisfaction of the owner and the Engineer, in accordance with Section 10, "Underground Utilities".

14-4 Retention Basin Excavation

Excavation slopes, including basin floor areas, shall be finished to the lines and grades indicated on the Plans or established by the Engineer. All debris and loose material shall be removed and all surfaces brought to a reasonably smooth and even condition, subject to the following tolerances. When completed, the average plane of the basin floor shall not vary more than two-tenths (0.2) foot from the design elevations. The average plane of the slopes shall conform to the slopes indicated on the Plans, and no point on the completed slopes shall vary from the designated grade by more than five tenths (0.50) foot measured vertically from the proposed grade.

The tops and bottoms of excavation slopes shall be rounded as indicated on the Plans, or as directed by the Engineer.

14-5 Maintaining Drainage, Trench and Structure Excavation

The Contractor shall comply with the requirements of Section 7-28, "Maintaining Drainage", and the following. The Contractor shall keep trench and structure excavations as dry as practicable throughout the construction period, subject to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar". Trenches damaged because of failure to provide temporary drainage control shall be repaired or reconstructed at the Contractor's expense. The cost of providing temporary drainage control shall be included in the various bid items of work with no additional compensation paid therefor.

14-6 Maintaining Drainage, Retention Basin Excavation

Reference is made to Section 7-28, "Maintaining Drainage". Excavation of a retention basin shall not prevent the use of the excavated area, or a portion thereof, for storage of storm water runoff or non-storm-related flows such as seasonal lawn over-irrigation water, swimming pool draining, or discharge of irrigation tail-water from adjacent agricultural land, where said basin has historically received such water prior to the Contractor beginning excavation.

Unless otherwise specified in the Special Provisions, where a retention basin contains water preventing the Contractor from commencing with the excavation as shown on the Plans, the Contractor shall provide dewatering of the basin to allow excavation to proceed in a timely manner. The Contractor shall notify the Engineer of the date when basin dewatering is proposed to start, and shall make all arrangements necessary for the disposal of the water in advance, including obtaining any required permits from jurisdictional agencies or irrigation districts. Disposal methods shall be approved in advance by the Engineer. Sufficient lead-time for dewatering the basin shall be provided by the Contractor to allow the excavation to proceed in a timely manner.

After the initial dewatering of the basin by the Contractor, or after initial dewatering of the basin by the District when so specified in the Special Provisions, or in cases where there is initially no water in the basin preventing the commencement of excavation, the Contractor shall thereafter make provisions for water entering the basin during excavation by conducting its operations, including temporary berming and pumping, so as to allow for the orderly excavation of the site and its continued and uninterrupted use for storage of said waters. Details of the Contractor's operations shall be approved by the Engineer prior to commencing. Pipelines and surface

channels draining into the basin shall be kept open at all times, unless otherwise approved in advance by the Engineer.

In the event the work area is completely inundated because of storm conditions and, in the opinion of the Engineer that: (1) the Contractor has diligently prosecuted the work up to the time of inundation, and (2) work can no longer proceed for an unreasonably long period, the Contract will be temporarily suspended, as provided in Section 8-10, "Temporary Suspension of Work", until such time as the Engineer determines that work can proceed.

If the work will be interrupted for a short period only, as determined by the Engineer, in lieu of a temporary suspension of the Contract, an extension in Contract time will be granted, subject to the above two (2) same conditions and in accordance with Section 8-12, "Liquidated Damages", for the period for which it is determined by the Engineer that the Work could not proceed.

No additional compensation will be paid for initial dewatering of the basin, maintaining drainage including temporary berming, pumping, or any other measures required to permit completion of the required excavation, or for delays due to the extension or temporary suspension of the Contract. Such costs shall be deemed as included in the various Contract items of Work

14-7 Disposal of Excess Materials

The Contractor shall acquire a suitable site for the legal disposal of excess material, including existing paving or other deleterious material removed by trenching and structure excavation or retention basin excavation operations, in accordance with Section 7-31, "Disposal of Material". In disposing of such material, the Contractor shall comply with all local, State, or Federal regulations and laws governing such disposal. Reference is also made to Section 7-20, "Trenches and Excavations – Hazardous Waste".

Full compensation for acquiring the site and disposing of excess material shall be included in the prices paid for the various items of the Work requiring excavation, as specified in the various sections of these Specifications, and no additional payment will be made therefor.

14-8 Payment

Trench Excavation and Structure Excavation as specified in this Section 14 will be paid for in accordance with the provisions specified in the various sections of these Specifications covering construction requiring Trench or Structure Excavation. All costs pertaining to such excavation shall include the costs for any and all permits required by law, regulation, or these Specifications, to conduct Trench and Structure Excavation.

Retention Basin Excavation, unless otherwise specified in the Special Provisions, will be paid for at the unit price bid per cubic yard of excavation which shall include the full cost for providing and furnishing all labor, materials, tools, and equipment and doing all the work involved in retention basin excavation, including but not limited to finish grading, disposal of material, maintaining drainage including pumping and temporary berming, and any and all permits required by law, regulation, or these Specifications to conduct Retention Basin Excavation as herein specified.

SECTION 15 - TRENCH AND STRUCTURE BACKFILL, RETENTION BASIN EMBANKMENT CONSTRUCTION

15-1 General

This Work shall consist of furnishing all labor, equipment, materials and incidentals required for the performance of all backfill and embankment construction necessary or required for the construction of pipelines, structures, retention basins, and related facilities required for the collection, transportation and storage of storm water runoff, all as shown on the Plans and specified in the Special Provisions and these Specifications, the Standard Plans, and as directed by the Engineer. The Contractor shall also perform all trench and structure backfill, and embankment construction where applicable, in accordance with any special requirements of other sections of these Specifications or of the agencies responsible for issuing permits for the original excavation or other work.

15-2 Material

15-2.01 Native Material

Except as otherwise provided in these Specifications, material used for trench or structure backfill, or for retention basin embankments, shall be native material free from debris, lumps, hardpan chunks, paving material, organic matter or other deleterious or unsuitable substances. Native Material shall be approved by the Engineer before use in the Work.

15-2.02 Imported Material

In the event that Native Material does not conform to the materials requirements as may be specified in these Specifications or the Special Provisions, or there is insufficient Native Material to complete bedding, backfill or embankment construction operations due to unsuitability of the material or other causes as determined by the Engineer, or where the placement of imported material is shown on the Plans or specified in the Special Provisions, the Contractor shall import sufficient and suitable material as shown or specified to complete all operations. Imported Material shall be approved by the Engineer prior to use in the Work.

Where a bid item is provided therefor, Imported Material shall be paid for at the unit price bid. Where no bid item is provided, and where approved by the Engineer, the Contractor will be compensated for furnishing Imported Material as provided in Section 4-4, "Extra Work", and Section 9-5, "Payment for Extra Work". The cost for removing and disposing of unsuitable material, which had it otherwise been suitable for backfill or embankment construction, shall be included in the cost for providing Imported Material. No additional payment will be made therefor.

15-2.03 Slurry Cement Backfill

Slurry Cement, where shown on the Plans, specified in the Special Provisions, or approved by the Engineer to be used as trench or structure backfill or bedding material, shall conform to the provisions of Section 19-3.062, "Slurry Cement Backfill" of the Caltrans Standard Specifications, latest edition. Slurry Cement Backfill shall contain a minimum of one hundred eighty eight (188) pounds of Portland Cement (two 94 lb. sacks or bags) per cubic yard of mix. Where Slurry Cement Backfill is not shown on the Plans or specified in the

Special Provisions, and exigencies or other conditions warrant its use, or the Contractor for its convenience requests its use, Slurry Cement Backfill shall only be placed with the approval of the Engineer.

Where Slurry Cement Backfill is shown on the Plans or specified in the Special Provisions, payment will be made in accordance with the Special Provisions.

Where Slurry Cement Backfill is not shown on the Plans or specified in the Special Provisions, and is ordered by the Engineer, payment for Slurry Cement Backfill will be made as provided in Section 4-4, "Extra Work", and Section 9-5, "Payment for Extra Work".

Where Slurry Cement Backfill is approved for use by the Engineer, but it is for the Contractor's convenience, no payment will be made therefor.

In any case, the cost for removing and disposing of native material which otherwise would have been used for backfill shall be included in the cost for providing Slurry Cement Backfill, and no additional payment will be made therefor.

In accordance with said Caltrans Section 19-3.062, backfill may be placed over Slurry Cement Backfill no sooner than four (4) hours after placement of the Slurry Cement Backfill unless concrete sand is used for the aggregate in the slurry cement, the adjacent undisturbed material is free draining, and water is no longer standing on the cement slurry, all as determined by the Engineer.

15-3 Bedding

Where trenches are over-excavated due to unsuitable or unstable material as specified in Section 14-3, "Trench and Structure Excavation", Bedding for all pipe types allowed by these Specifications shall be placed in accordance with Section 19-3.025A, "Shaped Bedding", of the Caltrans Standard Specifications using select native material approved by the Engineer, or imported sand conforming to Section 19-3.025B, "Sand Bedding", of the Caltrans Standard Specifications, except that Bedding material for HDPE Plastic Pipe shall be Class IA, Class IB, Class II, or Class III conforming to ASTM Designation: D 2321 as provided in Section 22-3.02, "Bedding". For all pipe types, Bedding shall be placed in layers not exceeding six (6) inches in thickness and firmly compacted in accordance with Section 15-8, "Compaction", and graded smooth to provide consistent longitudinal contact and support for the pipe. Space for joint bells, collars, or other joint materials for all pipe types shall be accurately provided in the Bedding.

For trenches which exceed the maximum trench widths specified for the various types of pre-cast pipe allowed by these Specifications, or where Slurry Cement is permitted or specified to be used for Bedding, reference is made to Section 15-4.02, "Trench Backfill, Pre-Cast Pipe", and to subsections thereof for the kind of pipe involved, for additional Bedding requirements.

The cost for providing Bedding shall be considered as included in the price paid for the type of pipe involved, and no additional payment will be made therefor.

15-4 Trench Backfill, General

Trench Backfill shall consist of material conforming to Section 15-2.01, "Native Material", or Section 15-2.02, "Imported Material". Where shown on the Plans, specified in the Special Provisions, or approved by the Engineer, Slurry Cement used for bedding or backfill shall conform to Section 15-2.03, "Slurry Cement Backfill". Trench Backfill for the various types of pipe allowed by these Specifications shall conform to the following provisions.

15-4.01 Trench Backfill, Cast-in-Place Concrete Pipe

Backfill for trenches in which cast-in-place concrete pipe has been constructed shall consist of placing backfill material into the remaining trench cavity in one phase. Backfill shall be accomplished as soon as practicable and shall follow pipe construction by no more than seven (7) working days or as directed by the Engineer, provided that in no case shall backfill material be placed over the pipe sooner than twenty-four (24) hours following construction of the pipe. Backfill material shall be returned to the trench in lifts not to exceed eight (8) inches in thickness. Unless otherwise restricted by the jurisdictional agency permit, depending on the type of soil and compaction equipment used, the thickness of lifts may be increased by the Engineer, but not to exceed two (2) feet. Each lift shall be moisture conditioned to optimum levels for the full thickness of the lift to achieve or exceed the required compaction as specified in Section 15-8, "Compaction", prior to placement of the next lift of backfill material. In no case shall backfill material be allowed to free-fall directly onto the pipe. During the period before backfill is returned to the trench, at locations determined by the Engineer, the Contractor may be required to furnish and install steel trench plates for access, traffic, or safety reasons, with no additional payment therefor.

15-4.02 Trench Backfill, Pre-Cast Pipe

Backfill material for trenches in which pre-cast pipe has been installed shall be placed in two phases, classified as Initial Backfill and Final Backfill. Reference is made to the Standard Plans, Drawing No. G-1, "Trench Excavation, Backfill, Surface Restoration".

Initial backfill shall be considered as that material placed from the bottom of the trench where no bedding is required, or from top of bedding material where bedding is required, to one (1) foot above the outside top of the pipe. Initial backfill shall be accomplished no more than twenty-four (24) hours following trench excavation, and in most cases, as pipe-laying progresses.

Final backfill shall be considered as that material placed from the top of initial backfill to the bottom of the structural section of the trench Surface Restoration. Final backfill shall be accomplished as soon as practicable, except that for mortar-joint concrete pipe, final backfill shall not be placed until, in the opinion of the Engineer, the cement mortar in the joints has acquired a suitable degree of hardness. In no case, however, shall final backfill follow initial backfill by more than twenty-four (24) hours, nor initial excavation by more than forty-eight (48) hours. Final Backfill shall also conform to Section 15-4.03, "Final Backfill, Pre-Cast Pipe".

During the period before backfill is returned to the trench, at locations determined by the Engineer, the Contractor may be required to furnish and install steel trench plates for access, traffic, or safety reasons, with no additional payment therefor.

Initial Backfill for pre-cast pipe shall conform to the following provisions.

15-4.02.1 Initial Backfill, RCP

Reference is made to Section 17-4.05, "Initial Backfill and Compaction". Initial Backfill for RCP shall be accomplished as soon as practicable but no later than the time specified in Section 15-4.02, "Trench Backfill, Pre-Cast Pipe". Initial Backfill shall consist of placing and firmly compacting backfill material under the haunches and to the springline of the pipe so as to form a firm bedding for the pipe and prevent movement of the pipe during jointing operations. When jointing operations are complete, backfill shall then be placed and compacted to a depth of one (1) foot above the top of the pipe to prevent movement during final backfill and compaction operations. The material shall be placed in lifts not to exceed eight (8) inches in depth unless otherwise authorized by the Engineer, moisture conditioned to optimum levels for the full thickness of each lift, and each lift compacted in compliance with Section 15-8, "Compaction" to achieve or exceed the required compaction. Jurisdictional agency permits may restrict the lift thickness to eight (8) inches.

15-4.02.1(A) Special Initial Backfill, RCP

As provided in Section 17-4.05.1, "Special Initial Backfill", where a Special Initial Backfill detail is shown on the Plans or specified in the Special Provisions, the Contractor shall furnish and place material for Initial Backfill in compliance with said detail or specification. In cases where native material is unsuitable for Initial Backfill as determined by the Engineer, the Contractor shall furnish and place material for Initial Backfill which complies with Section 19-3.025B, "Sand Bedding", of the Caltrans Standard Specifications. In lieu of providing Sand Bedding, the Contractor may request the Engineer to provide an alternative Initial Backfill detail which may include, but not be limited to, furnishing a higher strength class of pipe, a concrete cap, cradle, or arch, limitations on trench width, or special bedding requirements for the conditions under which the pipe is placed.

Use of Slurry Cement conforming to Section 15-2.03, "Slurry Cement Backfill", or Class "B" Concrete conforming to Section 12, "Portland Cement Concrete; Cement Mortar", as bedding or backfill shall only be used with the specific approval of the Engineer or where specified in the Special Provisions.

No additional payment will be made for providing sand bedding, a higher strength class of pipe, a concrete cradle or arch, special bedding, or slurry cement bedding or backfill, unless otherwise specified in the Special Provisions.

15-4.02.2 Initial Backfill, PVC Pipe

Reference is made to Section 18-3.05, "Initial Backfill and Compaction". Initial backfill for PVC Pipe shall conform to the requirements of Section 15-4.02.1, "Initial Backfill, RCP".

15-4.02.2(A) Special Initial Backfill, PVC Pipe

As provided in Section 18-3.01.1, "Trench Widths", where the trench width exceeds the maximum trench width specified in said Section 18-3.01.1, as measured at the top of the pipe, the Contractor shall provide shaped bedding in conformance with Sections 19-3.025A, "Shaped Bedding", and 19-3.025B, "Sand Bedding", of the Caltrans Standard Specifications. In lieu of providing shaped sand bedding, with the approval of the Engineer, the Contractor may provide a higher strength class of pipe in accordance with the manufacturer's recommendation for the conditions under which the pipe is placed.

Use of Slurry Cement conforming to Section 15-2.03, "Slurry Cement Backfill", as bedding or backfill shall only be used with the specific approval of the Engineer or where specified in the Special Provisions. In such cases, the Contractor shall take appropriate measures to anchor the pipe to prevent floating, as specified in Section 18-3.03.1 "Floatation Prevention". Any pipe that has floated shall be removed and replaced at the correct line and grade.

No additional payment will be made for providing shaped sand bedding, a higher strength class of pipe, or slurry cement bedding or backfill, unless otherwise specified in the Special Provisions.

15-4.02.3 Initial Backfill, CMP

Reference is made to Section 21-5, "Initial Backfill and Compaction". Before proceeding with Initial Backfill, the bottom of the trench for CMP shall be prepared in accordance with Section 19-3.025A, "Shaped Bedding", of the Caltrans Standard Specifications using select native material approved by the Engineer, or imported sand conforming to Section 19-3.025B, "Sand Bedding", of the Caltrans Standard Specifications. Initial Backfill for CMP shall conform to the requirements of Section 15-4.02.1, "Initial Backfill, RCP", and the following provisions:

Each layer of Initial Backfill shall be thoroughly rammed and hand tamped, being careful not to move or lift the pipe from its planned line and grade, to completely compact the material to the springline of the pipe, and then to one (1) foot above the pipe. Any pipe moved or lifted shall be removed and re-laid to the line and grade shown on the Plans.

Use of Slurry Cement conforming to Section 15-2.03, "Slurry Cement Backfill", as bedding or backfill shall only be used with the specific approval of the Engineer or where specified in the Special Provisions. In such cases, the Contractor shall take appropriate measures to anchor the pipe to prevent floating. Any pipe that has floated shall be removed and replaced at the correct line and grade.

No additional payment will be made for providing Initial Backfill as specified in this Section 15-4.02.3, including any approved use of Slurry Cement bedding or backfill.

15-4.02.4 Haunching and Initial Backfill, HDPE Plastic Pipe

Reference is made to Section 22-3.05, "Haunching, Initial Backfill, and Compaction", ASTM Designation: D 2321 and the HDPE manufacturer's specifications. The more restrictive of these shall govern the Haunching and Initial Backfill installation. Haunching shall consist of Initial Backfill material placed underneath the pipe haunches up to the springline of the pipe in layers not to exceed six (6) inches in depth, with each layer compacted in conformance with Section 15-8, "Compaction". Each layer shall be thoroughly rammed and hand tamped, being careful to completely compact the material but in such a manner as not to move or lift the pipe from its planned line and grade. The pipe shall be anchored as necessary to prevent movement or lifting. Any pipe that is moved or lifted shall be removed and re-laid to the line and grade shown on the Plans.

Initial Backfill shall then be placed above the haunching in layers not to exceed six (6) inches in depth to a height of one (1) foot above the outside top of the pipe. Each layer shall be compacted in conformance with said Section 15-8. Haunching and Initial Backfill material shall meet the requirements of Class IA, Class IB, Class II, or Class III of ASTM Designation: D 2321.

Use of Slurry Cement conforming to Section 15-2.03, "Slurry Cement Backfill" as bedding or backfill shall only be used with the specific approval of the Engineer or where specified in the Special Provisions. In such cases, the Contractor shall take appropriate measures to anchor the pipe to prevent floating as specified in Section 22-3.03.1, "Floatation Prevention". Any pipe that has floated shall be removed and re-laid at the correct line and grade.

15-4.03 Final Backfill, Pre-cast Pipe

Final Backfill shall consist of placing approved backfill material into the remaining trench cavity following completion of Initial Backfill. Reference is made to Section 15-4.02, "Trench Backfill, Pre-Cast Pipe", for Final Backfill timing requirements. Final Backfill shall extend from the top of Initial Backfill to the bottom of the structural section for Surface Restoration. Reference is made to the Standard Plans, Drawing No. G-1, "Trench Excavation, Backfill, Surface Restoration". Backfill material shall be returned to the trench in lifts not to exceed eight (8) inches in depth. Unless otherwise restricted by jurisdictional agency permits, depending on the type of soil and compaction equipment used, the thickness of lifts may be increased by the Engineer, but not to exceed two (2) feet. Each lift shall be moisture conditioned to optimum levels for the full thickness of the lift to achieve or exceed the required compaction as specified in Section 15-8, "Compaction", prior to placement of the next lift of backfill material. In no case shall backfill material be allowed to free-fall directly onto the pipe.

Where Slurry Cement Backfill is used to only partially fill the depth of the excavation, and soil backfill will be placed over the top of the slurry cement for the remainder of the excavation depth, the soil backfill shall be placed in conformance with this Section 15-4.03,

but no sooner than four (4) hours after placement of the Slurry Cement Backfill, or as otherwise provided Section 15-2.03, "Slurry Cement Backfill", or as directed by the Engineer. Compaction of soil backfill shall conform to the requirements of said Section 15-8.

15-5 Structure Backfill

Structure backfill shall consist of placing and compacting backfill material around structures to the lines and grades designated on the Plans or directed by the Engineer. Backfill and compaction for cast-in-place structures shall comply with the time and placement requirements for trench backfill for cast-in-place pipe as specified in Section 15-4.01, "Trench Backfill, Cast-in-Place Concrete Pipe". Backfill and compaction of pre-cast structures shall comply with the placement requirements for trench backfill for pre-cast pipe, including the use of Slurry Cement Backfill where approved by the Engineer, as specified in Section 15-4.02, "Trench Backfill, Pre-Cast Pipe". New manholes constructed in-line with new pipelines shall use the same backfill requirements applied to the pipeline.

Unless otherwise provided in the Special Provisions, Structure Backfill for pump stations shall not be subject to the above time and placement requirements, but performed in a manner that permits completion of the Work within the time specified in the Contract.

Compaction of Structure Backfill shall conform to the requirements of Section 15-8, "Compaction".

15-6 Embankment Construction, Retention Basins

Embankment construction shall consist of the construction or reconstruction of retention basin dikes, side slopes, floor areas, or any other special feature requiring embankment construction, placing and compacting approved material to the lines and grades indicated on the Plans or established by the Engineer, finish grading, and maintaining drainage.

Areas to receive embankment construction shall first be cleared of all debris, bushes, weeds, stumps, or other deleterious material, in accordance with Section 13, "Clearing and Grubbing". If embankment material is to be placed on existing slope areas, the existing surface shall be plowed, disked or scarified to a minimum depth of four (4) inches to produce a bond with the material to be placed.

Unless otherwise specified in the Special Provisions, embankment material shall consist of select native material obtained from the site and approved by the Engineer, and shall conform to the requirements of Section 15-2.01, "Native Material".

Embankments shall be constructed and compacted in layers of specified uniform thickness, but in no case shall any layer exceed two (2) feet in thickness. Construction shall be to the lines and grades indicated on the Plans and finish graded to provide a reasonably smooth and even surface, subject to the following tolerances. When completed, the average plane of the basin floor shall not vary more than two-tenths (0.2) foot from the design elevations. The average plane of the slopes shall conform to the slopes indicated on the Plans, and no point on the completed slopes shall vary from the designated slope by more than five tenths (0.5) foot measured vertically from

the slope. The tops and bottoms of embankment slopes shall be rounded as indicated on the Plans, or as directed by the Engineer.

Compaction of embankments shall conform to Section 15-8, "Compaction".

15-7 Emergency Backfill

At locations where traffic, safety, or other considerations warrant, the Engineer may order the immediate backfill of trenches or other excavations, regardless if the pipes or structures have been installed or not. Where pipe or structure was not installed, the trench or structure site shall not be re-excavated until provisions are made to prevent the conditions which caused the backfill to be ordered. No additional compensation will be paid for Emergency Backfill and re-excavation.

15-8 Compaction

Compaction of trench and structure backfill and embankments shall be accomplished by moisture-conditioning the backfill material to optimum levels, supplemented by the use of approved compaction equipment, and shall equal or exceed the compaction herein required. Jetting of backfill material will not be permitted. Relative compaction of trench and structure backfill shall be determined by the Caltrans California Test Method 216, Test Method 231, or ASTM D1557, as appropriate for the location being tested, or as required by the jurisdictional agency permit. The frequency, locations, and intervals of tests shall be determined by the Engineer.

Reference is made to the Standard Plan for Trench Excavation, Backfill, and Surface Restoration. Backfill of all trench and structure excavations located in public rights of way subject to permits issued by the jurisdictional agency shall be compacted to a minimum of ninety (90) percent relative compaction from the bottom of the excavation, including any over-excavation required pursuant to Section 14-3, "Trench and Structure Excavation", to two (2) feet below the finished surface grade of the excavation. The remaining two (2) feet of the backfill shall be compacted to a minimum of ninety five (95) percent relative compaction. These requirements are subject to the special compaction requirements of other sections of these Specifications or of the agencies responsible for issuing permits for the original excavation, regardless if said permit was issued or not. The more restrictive requirements of the jurisdictional agency or these Specifications shall apply.

Unless otherwise shown on the Plans or specified in the Special Provisions, Work located in rights of way not subject to jurisdictional agency permits, such as in District retention basins or easement areas, backfill for trench or structure excavation, except for pumping stations, shall have a relative compaction of not less than eighty five (85) percent from the bottom of the excavation to within two (2) feet of the surface finish grade. The remaining top two (2) feet shall have a relative compaction of not less than ninety (90) percent.

Pumping station backfill shall be compacted to a minimum of ninety five (95) percent relative compaction for the full depth and horizontal width of the pump station excavation up to the surface finish grade shown on the Plans. Reference is made to Section 26-3.05, "Backfill and Compaction".

Embankments shall be compacted to a minimum of eighty five (85) percent relative compaction or as specified in the Special Provisions. Relative compaction of embankments shall be determined by the test method specified for trench and structure backfill as provided in this Section 15-8.

Initial compaction testing shall be provided by the District at no cost to the Contractor. The Contractor shall file adequate notice to the Engineer when he desires compaction testing. All required compaction retesting of backfill because of failure to pass original tests shall be at the expense of the Contractor.

Attention is directed to Section 7-10, "Permits, Licenses, and Fees". A permit is required to obtain water from the jurisdictional agency's water system for use in moisture conditioning or other methods of compaction, or any other construction activities requiring the use of water. The Contractor shall make arrangements with the Engineer for any water obtained from District retention basins used for compaction or other construction purposes.

15-9 Maintaining Drainage, Retention Basin Embankment Construction

Reference is made to Section 7-28, "Maintaining Drainage", and Section 14-6, "Maintaining Drainage, Retention Basin Excavation". Construction of embankments shall not prevent the use of the retention basin, or a portion thereof, for storage of storm water runoff, summer lawn over-irrigation water, or other non-storm related water from other sources, where said basin has historically received such water prior to the Contractor beginning construction.

The contractor shall conduct his operations, including temporary berming and pumping, so as to allow for the orderly construction of the site and its continued and uninterrupted use for storage of said waters. Details of the Contractor's operations shall be approved by the Engineer prior to commencing. Pipelines and surface channels draining into the basin shall be kept open and operable unless otherwise approved in advance by the Engineer.

In the event the Work area is completely inundated because of storm conditions, and, in the opinion of the Engineer that: (1) the contractor has diligently prosecuted the work up to the time of inundation, and (2) Work can no longer proceed for an unreasonably long period, the Contract will be temporarily suspended as provided in Section 8-10, "Temporary Suspension of Work", until such time as the Engineer determines that work can proceed.

If the Work will be interrupted for a short period only, as determined by the Engineer, in lieu of a temporary suspension of the Contract, an extension in Contract time will be granted, subject to the above two same conditions and in accordance with Section 8-12, "Liquidated Damages", for the period for which it is determined by the Engineer that Work could not proceed.

No additional compensation will be paid for maintaining drainage, or for delays due to the extension or temporary suspension of the Contract. Such costs shall be deemed as included in the various bid items of work.

15-10 Measurement and Payment

Trench and Structure Backfill and Compaction will be paid for in accordance with the provisions specified in the various sections of these Specifications covering construction requiring Trench or Structure Backfill, or as otherwise specified in the Special Provisions.

Unless otherwise specified in the Special Provisions, Retention Basin Embankment will be paid for at the unit price bid per cubic yard of embankment which shall include the full cost of providing and furnishing all labor, materials, tools and equipment, and doing all the work involved in the construction of embankments including, but not limited to, preparing areas to receive embankment construction, placing and compacting of embankment material including Imported Material as required or specified, finish grading to tolerances herein provided, maintaining drainage including pumping and temporary berming, and any other incidentals pertaining thereto.

SECTION 16 - RESTORATION OF SURFACES

16-1 General

Restoration of surfaces shall consist of restoring the surfaces of all trenches, at or around structures, or other excavation sites, or any other surfaces damaged or disturbed by the Work. Restoration of surfaces shall be performed as shown on the Plans or specified in the Special Provisions or permit issued by the jurisdictional agency, and in accordance with these Specifications. Where details of restoration are not shown on the Plans or specified in the Special Provisions or permit, disturbed surfaces shall be restored to equal or better condition and structural properties, as determined by the Engineer, existing prior to commencement of the Work. Surfaces shall include, but not be limited to, pavement of any kind including asphalt concrete (AC), concrete paving, brick or other paving stones, or improvements such as concrete sidewalks, curbs and gutters, concrete valley gutters, grass, shrubbery or other landscaping, gravel, and treated or untreated soil.

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". No additional payment will be made for increased amounts of Surface Restoration required due to soil conditions differing from those anticipated by the Contractor.

16-2 Temporary AC Pavement Replacement

Unless otherwise shown on the Plans, specified in the Special Provisions, or otherwise required by the jurisdictional agency issuing the permit for the Work, Temporary AC Pavement Replacement shall consist of a minimum thickness of one and one-half (1½) inches of "cold mix" asphalt concrete mixed in a central plant. The Contractor shall make himself aware of the minimum cold-mix patch thicknesses of jurisdictional agencies, as the more restrictive requirements shall apply, and no additional payment will be made therefor. Temporary AC Pavement Replacement shall be placed over the full width of removed pavement at all locations determined by the Engineer to need interim surfacing until placement of final surfacing. Locations may include certain portions of main or lateral trenches, traffic or pedestrian crossings, access points, and excavations on private property.

The Temporary AC Pavement shall be diligently maintained and replaced as often as necessary by the Contractor to provide a safe, smooth and stable vehicular or pedestrian pathway until permanent pavement is installed. Inspections and repairs shall be performed during and after normal work hours, weekends, and holidays, and at sufficient intervals to insure continuous stable and smooth conditions. All Temporary AC Pavement Replacement shall be removed and disposed of prior to placement of Permanent AC Pavement Replacement.

16-3 Permanent AC Pavement Replacement

Unless otherwise specified in the Special Provisions or jurisdictional agency permit, Permanent AC Replacement shall conform to the Standard Plans, Drawing No. G-1, "Trench Excavation, Backfill, Surface Restoration", and these Specifications. This Section 16-3 shall apply to Permanent AC Pavement Replacement within the public right of way and on private property.

16-3.01 Materials

Unless otherwise shown on the Plans or specified in the Special Provisions, Permanent AC Pavement Replacement shall be composed of placing a structural section consisting of, as a minimum, Type "B" Asphalt Concrete conforming to Section 39, "Asphalt Concrete", of the Caltrans Standard Specifications, latest edition, over Class 2 Aggregate Base conforming to Section 26, "Aggregate Bases", of said Caltrans Standard Specifications, or over compacted backfill or subbase, or both, to the dimensions and details shown on the Plans or specified in the Special Provisions or jurisdictional agency permit where applicable. Deviation from these requirements, unless approved by the Engineer and the jurisdictional agency so indicated, shall be cause for rejection of the Work. The specifications and standards of the jurisdictional agency are incorporated herein by reference only, and it shall be the Contractor's responsibility to make itself aware of the contents of these documents. Other Permanent Pavement Replacement materials specified by the Special Provisions shall comply with the requirements therein.

In addition to the requirements of said Section 39, "Asphalt Concrete", asphalt binder to be mixed with aggregate to manufacture Asphalt Concrete shall comply with the requirements of Rule 4641, "Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations", of Regulation IV, "Prohibitions", of the San Joaquin Valley Air Pollution Control District.

16-3.02 Pavement Removal and Replacement Limits

The limits of existing pavement removal and replacement along the outside edges of trenches shall be as shown on the Plans, or specified in the Special Provisions or jurisdictional agency permit. The edge limits of pavement removal and replacement for trenches in the longitudinal direction of the street may extend well beyond the edges of the trench depending on the location of the trench within the vehicular travel lane or edge of roadway, as provided below.

Additional removal and replacement may be required to position the edge of pavement replacement away from the normal wheel track. Additional removal and replacement may also be required along edges adjacent to curbs and gutters or valley gutters, or along the edge of pavement where no curbs or gutters exist, if only a small width of existing pavement remains after trench excavation.

The limits of removal and replacement of pavement along the edges of lateral pipeline trenches or structures shall be as shown on the Plans or specified in the Special Provisions or jurisdictional agency permit, or as directed by the Engineer.

The Contractor shall make itself fully aware of the limits of pavement removal and replacement prior to submitting a bid.

16-3.03 Edge Trimming, Sawcutting

Where saw-cutting of existing pavement edges is not specified, all damaged existing pavement shall be removed and the edges trimmed to neat lines, no less than the minimum distance from the edge of trench as specified herein, by a method approved by the Engineer.

Where saw-cutting of existing pavement edges is specified, the cut shall be made on a straight line along both sides of trenches no less than the minimum distance from the edge of trench as specified herein, and to neat lines around structures or other locations requiring pavement replacement. The cut shall be made a minimum of three (3) inches in depth, or such other depth as may be specified in the Special Provisions or directed by the Engineer, and shall encompass all pavement damaged by the work or specified to be removed or replaced.

All edges of existing pavement, whether trimmed or saw cut, shall be protected from damage. Any edges damaged from any cause prior to or during paving operations, shall be re-cut or re-trimmed as directed by the Engineer, and no additional payment will be made therefor.

The Contractor's attention is directed to the Standard Plans, Drawing No. G-1, "Trench Excavation, Backfill, Surface Restoration". After trimming or sawcutting trench edges, prior to the final lift of paving an additional amount of the existing pavement shall be ground and repaved beyond the trench edges to conform to the Plans, as specified in the Special provisions or as shown on the Standard Plan. The amount shown is minimum; the jurisdictional agency permit may require different widths or thicknesses to be ground and repaved. The more restrictive requirements of the jurisdictional agency, the Plans, or the Standard Plan shall apply, as determined by the Engineer. No additional payment will be made for sawcutting, grinding and replacement of this pavement.

16-3.04 Paint Binder (Tack Coat) and Seal Coat

A paint binder of asphaltic emulsion (Tack Coat), shall be furnished and applied in conformance with Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)", Section 94, "Asphaltic Emulsions", of the Caltrans Standard Specifications, latest edition, and Rule 4641, "Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations", of Regulation IV, "Prohibitions" of the San Joaquin Valley Air Pollution Control District. Paint Binder (Tack Coat) shall be applied to all vertical surfaces of existing pavement, curbs, gutters, or other surfaces against which asphalt concrete pavement is to be placed.

If the pavement is to be replaced in lifts, and the time interval between placement of any two lifts exceeds four (4) hours, Paint Binder shall be applied to the top surface of the lower layer of asphalt concrete.

Where designated on the Plans or specified in the Special Provisions or jurisdictional agency permit, a Seal Coat conforming to Section 37-1, "Seal Coats", of the Caltrans Standard Specifications, and to said Rule 4641, shall be applied to the surface of the new AC Pavement and adjacent existing pavement to the width dimensions shown on the Plans or specified in the Special Provisions or jurisdictional agency permit, or as directed by the Engineer.

16-3.05 Construction

Permanent AC Pavement Replacement shall be accomplished as soon as possible and practicable, and within the time limits specified in the Special Provisions. It shall be performed in a manner consistent with good construction practices and methods conforming to Section 39, "Asphalt Concrete", and Section 26, "Aggregate Bases", of the Caltrans Standard Specifications, and shall be approved by the Engineer.

Prior to commencing replacement operations, areas to receive Permanent AC Pavement Replacement shall be completely cleaned of all debris, rubbish, dirt, temporary paving, or any other deleterious material which might affect the quality of the Work in any way. Excess trench or excavation material shall not be spread over any part of the project site, unless authorized by the Engineer, and shall be disposed of in accordance with Section 7-31, "Disposal of Material". Cleaning shall be accomplished to a minimum of six (6) feet outside the edges of trenches or other areas to receive pavement replacement. This distance may be increased by the Engineer as necessary to prevent contamination of the new Work.

No aggregate base or asphalt concrete shall be placed until all underlying backfill or subbase is firm, stable and unyielding and has been compacted in accordance with Section 15-8, "Compaction", and approved by the Engineer for commencing Permanent AC Pavement Replacement.

When replacing pavement in areas where saw cutting of existing pavement is specified, or the pavement will be placed next to the edge of existing concrete improvements such as curb and gutter or valley gutters, the new pavement material shall not overlap the existing pavement or concrete improvement edge. When compacted, the new pavement edge shall be flush with the existing pavement or concrete improvement edge, and the entire surface shall be smooth, without humps or depressions.

When completed, all areas requiring permanent replacement of AC pavement shall be left with as neat an appearance and smooth vehicular riding quality as possible. There shall be no humps, depressions, voids or other irregularities in the final surfacing; any such defects shall be cause for rejection of the Work.

16-4 Miscellaneous Surface Restoration

Restoration of Miscellaneous Surfaces within the public right of way and on public property shall consist of, as a minimum, replacing or restoring in-kind any surface (other than AC pavement which is covered by Section 16-3, "Permanent AC Pavement Replacement") damaged or disturbed by the Work, including but not limited to, concrete paving, paving stones, sidewalks made of concrete or other materials, curb and gutter, valley gutters, grass, landscaping of any kind, gravel, oiled dirt, concrete, or soil. Replacement of sections of concrete sidewalk, curb and gutter, and valley gutters damaged by the Work shall conform to Section 27, "Curbs, Gutters, Valley Gutters, Sidewalks and Mowstrips", except for payment.

Unless otherwise shown on the Plans or specified in the Special Provisions or jurisdictional agency permit, the surfaces of all trenches, excavations or other areas damaged or disturbed by

the Work, upon completion of Miscellaneous Surface Restoration, shall conform to the elevations and character of the areas which existed before Work commenced.

16-5 Traffic Markings Replacement

Any traffic markings including, but not limited to, painted lane lines, reflective markers, crosswalks, pavement stenciling, or any other pavement markings, removed or damaged by the Work shall be replaced to the standards of the jurisdictional agency. Where only a portion of a pavement marking such as a crosswalk or “stop ahead” stenciling is removed, the entire marking shall be repainted. Traffic Markings shall be restored using the paints authorized by the jurisdictional agency. Reflective markers shall be replaced in-kind, unless otherwise shown on the Plans or specified in the Special Provisions or directed by the Engineer or the jurisdictional agency. For markings requiring stenciling, the Contractor shall contact the Street Maintenance personnel of the jurisdictional agency to determine if the agency’s stencils are to be used to repaint damaged markings, and make all necessary arrangements therefor. The Contractor shall pay all costs for the arrangement and use of said stencils, which shall be included in the cost of replacing traffic markings.

16-6 Measurement and Payment

Where a bid item is provided, payment for Temporary AC Pavement Replacement shall be made at the unit or lump sum price bid therefor. Payment shall include full compensation for all labor, tools, materials and equipment for doing all of the Work involved. Payment for any location receiving Temporary AC Pavement Replacement shall be made only once, regardless of the number of times the Contractor is required to replace the temporary pavement at that location. Where no bid item is provided, all costs for Temporary AC Pavement Replacement shall be included in the various bid items of Work, and no separate or additional payment will be made therefor.

Permanent AC Pavement Replacement will be paid for at the unit price bid per lineal foot or as otherwise specified in the Special Provisions, and shall include full compensation for furnishing all labor, asphalt concrete and other materials such as, but not limited to, aggregate base when specified, tools and equipment, and doing all the work involved in replacing pavement in place as herein specified, including saw-cutting or other trimming of edges, furnishing and applying paint binder, and furnishing and applying seal coat when specified.

Where a bid item(s) is provided, Miscellaneous Surface Restoration and/or Traffic Markings Replacement will be paid for at the unit or lump sum price bid therefor. Payment shall include full compensation for all labor, tools, materials and equipment for doing all of the Work involved. Where no bid item(s) is provided, all costs for Miscellaneous Surface Restoration and/or Traffic Markings Replacement shall be included in the costs for the various bid items of Work, and no separate or additional payment will be made therefor.

SECTION 17 – REINFORCED CONCRETE PIPE (RCP)**17-1 General**

This Work shall consist of furnishing all labor, materials, tools and equipment for installing Reinforced Concrete Pipe (RCP) at the locations shown on the Plans and specified in the Special Provisions, and in accordance with these Specifications and as directed by the Engineer. RCP shall be of the size, joint type, and strength class shown on the Plans or specified in the Special Provisions. The pipe strength class, as designated on the Plans, has been determined for vertical load under average trench conditions. Reference is made to Section 2-4, “Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions”, and Section 2-5, “Pre-bid Tests”. Prior to submitting a bid proposal, the Contractor shall have conducted such tests it determines necessary to satisfy itself as to the trench conditions to be encountered throughout the project, and the effects thereof on the strength class and installation requirements of RCP. No additional payment will be made due to soil or trench conditions differing from that anticipated by the Contractor. Reference is made to Section 17-4.01, “Excavation”, Section 17-4.02, “Bedding”, and Section 17-4.05.1, “Special Initial Backfill”.

17-2 Materials, Pipe

Unless otherwise shown on the Plans or specified in the Special Provisions, or unless otherwise required by a permit issued by a jurisdictional agency, RCP to be installed in the Work shall conform to ASTM Designation: C 76, as amended or revised. Upon request, the Contractor shall furnish to the Engineer a Certificate of Compliance from the manufacturer of the pipe in accordance with the provisions in Section 6-5, "Certificates of Compliance".

17-2.01 Pipe Substitutions

Certain pipes of other manufactures may be permitted, as provided below, to be used in lieu of RCP twenty-four (24) inches in diameter or smaller. In any such case, the diameter of the substituted pipe shall match the size of the RCP for which substitution is allowed, but shall not exceed twenty-four (24) inches, or such other diameter as provided below, unless otherwise approved by the Engineer in writing.

Unless otherwise specified in the Special Provisions, but subject to approval in advance by the Engineer, which approval will depend upon certain flow criteria and restrictions which must be reviewed and which may preclude substitution, PVC pipe conforming to Section 18, “Polyvinyl Chloride (PVC) Pipe”, may be substituted for RCP twenty four (24) inches in diameter or smaller, unless otherwise specifically approved by the Engineer in writing. The substituted PVC pipe shall equal or exceed the bearing capacity of the RCP.

HDPE Plastic Pipe conforming to Section 22, “High Density Polyethylene (HDPE) Plastic Pipe”, shall be substituted for RCP twenty-four (24) inches in diameter or smaller only where shown on the Plans or specified in the Special Provisions or approved by the local jurisdictional agency as a permitted substitution, unless otherwise specifically approved by the Engineer in writing. The substituted HDPE Plastic Pipe shall equal or exceed the load bearing capacity of the RCP.

17-3 Materials, Joints

The ends of RCP sections shall be of such design that when properly laid they shall have a smooth and uniform interior surface. Both ends of pipe sections shall be substantially free of cracks and broken edges. Pipe so found to be damaged shall be rejected for use in the Work. Each joint shall be sealed to prevent leakage and shall be either rubber gasket or cement mortar as indicated on the Plans or specified in the Special Provisions. Pre-manufactured joints shall conform to the following specifications. Construction joints, where shown on the Plans, specified in the Special Provisions, or required by the Engineer, shall comply with Section 17-4.04, "Construction Joints".

17-3.01 Cement Mortar Joints

Mortar shall conform to the requirements of Section 12-8, "Cement Mortar", of these Specifications. The ends of the concrete pipe shall be thoroughly wetted and cleaned prior to the application of mortar.

The ends of the pipe, after being wetted and cleaned, shall be completely filled with mortar for the full periphery of the joint. The two sections to be joined shall be firmly placed together in such a manner that the bell or groove end of the pipe fits truly and snugly over the tongue end with maximum joint overlap at all points around the joint periphery. Mortar shall completely fill any space or gap within the joint. The interior surface of the pipe at the joint shall be brushed smooth and all surplus mortar removed. The completed surface of the joint on the interior of the pipe shall be flush with the pipe walls. Joints for pipes laid on curves shall comply with Section 17-5, "Curved Alignments".

An external mortar band at least four (4) inches wide and three-fourths ($\frac{3}{4}$) inch thick shall be applied to the pipe, centered on the joint, by first thoroughly cleaning and wetting the areas immediately adjacent to the joint and placing mortar around the upper two hundred seventy (270) degrees of the pipe at the joint. The width and thickness of the external band shall be completely and immediately covered with an impervious membrane which shall be adequately anchored.

In no case shall water be allowed to rise in or about the pipe before the mortar of the joint has become thoroughly set.

17-3.02 Rubber-Gasket Joints

Rubber-gasket joints shall conform to the requirements of ASTM Designation: C 443. Joints shall be flexible, watertight, and able to withstand expansion, contraction and settlement. Rubber Gasket Joints shall be adequate to withstand internal hydrostatic pressures up to thirteen (13) psi, or thirty (30) feet of pressure head, without leakage when tested in accordance with said ASTM Designation: C 443.

Rubber Gaskets (Elastomeric Seals) shall conform to ASTM C 1619. The gasket class shall be appropriate for the pressure requirements of the particular pipe application, and shall be oil resistant.

The ends of the rubber gasket pipe shall be thoroughly cleaned immediately prior to joining sections of pipe. The rubber gasket shall be lubricated per the pipe manufacturer's recommendations. The two sections joined shall be firmly placed together in such a manner that the tongue or gasket end of the pipe "homes" in the bell end of the pipe. No appreciable gap shall exist at the completed joint, except as permitted by the Engineer at locations where curves in the pipe alignment are specified or required. Reference is made to Section 17-5, "Curved Alignments". Excessive gaps in any case shall be cause for rejection of the work, and corrective measures shall be taken when ordered by the Engineer

17-4 Installation

RCP shall be installed in accordance with Section 8, "Prosecution and Progress of the Work", and with this Section 17-4.

17-4.01 Excavation

Excavation for installing RCP shall conform to the requirements of Section 14-3, "Trench and Structure Excavation", and to the following. The contractor shall exercise precautionary measures during trenching operations against trench cave-ins by providing adequate shoring or other devices to minimize the development of adversely wide trench conditions in the pipe zone. The Contractor shall comply with the requirements of Section 17-4.05.1, "Special Initial Backfill".

As specified in said Section 14-3, in trenches where rock, hardpan, wet, spongy, or other material unsuitable for pipe bedding is encountered in the trench bottom, as determined by the Engineer, the unsuitable material shall be over-excavated to the depths specified in said Section 14-3 for the type of material encountered. The over-excavated space shall be backfilled with bedding as provided in Section 17-4.02, "Bedding".

The cost of excavation of trenches, including trench over-excavation, shall be considered as included in the price paid for RCP, and no additional payment will be made therefor.

17-4.02 Bedding

Where trenches must be over-excavated pursuant to Section 14-3, "Trench and Structure Excavation", due to encountering unsuitable pipe bedding conditions during trench excavation, Bedding for RCP shall be furnished and placed in accordance with Section 15-3, "Bedding". The cost for providing Bedding shall be considered as included in the price paid for RCP, and no additional payment will be made therefor.

17-4.03 Pipe Laying

Pipes shall be laid in conformity with the prescribed lines and grades obtained from survey stakes set by the Engineer. The pipe shall be laid uphill from structure to structure with the bell end up-grade unless otherwise permitted by the Engineer. Pipe with elliptical reinforcement shall be placed with the minor axis in a vertical position. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. After each section of pipe has been laid to line and

grade, it shall be joined to the preceding section as required in Section 17-3, "Materials, Joints". After jointing procedures have commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 15-4.02.1, "Initial Backfill, RCP". For mortar joint pipe, no walking in the trench or working over the pipe after it has been laid, except as may be necessary in tamping the earth and refilling, will be permitted until the pipe has been braced as specified above.

17-4.04 Construction Joints

Reference is made to the Standard Plan for Construction Joints. Whenever two sections of pipe are to be connected where standard joints are not available, such as joining reinforced concrete pipe to cast-in-place concrete pipe or plastic pipe, or in cases where field conditions are encountered which require a pipe joint to be deflected at an angle exceeding the manufacturer's maximum recommended deflection and the Engineer approves the use of a construction joint, an external concrete collar shall be constructed around the full periphery of the pipe and extending one (1) foot on both sides of the joint. The collar shall be of a minimum thickness equal to that of the concrete pipe wall, but in no case less than four (4) inches thick. The interior of the joint shall be smoothed with cement mortar and brushed. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to construction of the collar.

17-4.05 Initial Backfill and Compaction

Initial Backfill shall be placed and compacted from the bottom of the trench where no bedding is required, or the top of bedding where it is installed, to one (1) foot above the outside top of pipe, in compliance with Section 15-4.02, "Trench Backfill, Pre-cast Pipe", Section 15-4.02.1, "Initial Backfill, RCP", and Section 15-8, "Compaction".

17-4.05.1 Special Initial Backfill

Where a Special Initial Backfill detail is shown on the Plans or specified in the Special Provisions, the Contractor shall furnish and place material for Initial Backfill in compliance with said detail or specification. In cases where native material is unsuitable for Initial Backfill as determined by the Engineer, the Contractor shall furnish and place Special Initial Backfill in conformance with Section 15-4.02.1(A), "Special Initial Backfill, RCP". No additional payment will be made for Special Initial Backfill.

17-4.06 Final Backfill and Compaction

Final backfill shall be performed in accordance with Section 15-4.03, "Final Backfill, Pre-cast Pipe". Compaction shall comply with Section 15-8, "Compaction".

17-4.07 Minimum Cover (Depth)

Unless otherwise shown on the Plans or specified in the Special Provisions, where it is necessary to deviate from the pipe elevations shown on the Plans, as determined by the Engineer, RCP shall be placed such that the minimum cover over the pipe shall be three (3) feet, as measured from the lowest finish roadway elevation or ground surface elevation for non-roadway installations, except that within retention basins, the minimum cover over the pipe shall be four (4) feet.

In cases where the minimum cover over the pipe as above specified may be reduced to less than the specified amounts, the Contractor shall provide and place a higher strength class of pipe and/or bedding as directed by the Engineer for the conditions encountered. The additional cost of a higher strength class of pipe or special bedding will be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work", but only when such change is directed by the Engineer.

17-5 Curved Alignments

Pipes shown on the Plans to be laid on a radius shall be placed in strict conformance with the alignment determined by marker stakes set by the Engineer. In cases where field conditions require unanticipated shifts in alignment, said shift shall be accomplished at a curvature approved by the Engineer such that pipe joints shall be deflected no greater than the manufacturer's maximum recommended deflection angle. At locations where maximum recommended deflection angles must be exceeded, the Engineer may authorize a construction joint conforming to Section 17-4.04, "Construction Joints", and the Standard Plan therefor.

Where adjustments in alignment do not require backfilling and re-excavating trenches, no additional payment will be made therefor. Where changes in alignment require backfilling and re-excavating trenches, the backfilling, compaction, and resurfacing the original trench, will be paid for as extra work in accordance with Section 4-4, "Extra Work", and Section 9-5, "Payment for Extra Work". Payment for construction joints will be made at the unit price bid therefor. Where no bid item is provided, construction joints will be paid for as Extra Work in accordance with said Section 4-4 and Section 9-5.

17-6 Protection of Pipe

The requirements of this Section 17 shall not relieve the Contractor of the provisions of Section 7-14, "Contractor's Responsibility for Work and Materials". The Contractor shall exercise every precaution against damage to the pipe, including damage from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the Work or repaired as directed by the Engineer.

17-7 Video Inspection

Where specified in the Special Provisions, or where directed by the Engineer, the Contractor shall furnish a closed circuit television inspection of the interior of the newly installed RCP. The pipe shall be video inspected for line, grade, joint integrity, damage, and debris. Any portion of the pipeline failing any one of the foregoing criteria shall be repaired, replaced or re-laid, or cleaned as directed by the Engineer. Failed locations shall be re-videoed. Video inspections, when required, shall be conducted after trenches have been backfilled and compacted, but before the replacement of permanent AC pavement. A DVD disc showing the initial video inspection, as well as any subsequent video inspections, shall be furnished to the District at no cost. All costs for providing Video Inspection shall be included in the price bid per lineal foot of RCP, and no additional payment will be made therefor.

17-8 Measurement and Payment

The length of Reinforced Concrete Pipe (RCP) to be paid for will be the horizontal length measured by the Engineer exclusive of structures, except that pipe placed in sloped areas of

retention basins or other substantially inclined surfaces, measurement shall be based on slope lengths, exclusive of structures. When pipes enter a structure at an angle different from a right angle and are cut to conform to the faces of the structure or of a slope, the quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or to the face of the slope.

The price paid per lineal foot of RCP shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all the Work involved in installing the pipe in place, including but not limited to excavation, backfill, and video inspection when required.

Reference is made to Section 33, "Miscellaneous Facilities and Operations". Where a bid item is provided for said Section 33, the cost for construction joints shall be included therein. Where no bid item is provided, the cost of construction joints shall be included in the price bid per lineal foot of RCP, and no additional payment will be made therefor.

17-9 Payment Retention

The placement of Reinforced Concrete Pipe (RCP) includes, but is not limited to, various items of work such as excavation, pipe installation, back filling and moisture conditioning, compaction, and clean-up. Section 17-8, "Measurement and Payment", is hereby modified to provide for the retention of up to fifty (50) per cent of the in-place value of Reinforced Concrete Pipe, or any substitutions allowed by this Section 17, said percentage to be determined by the Engineer in an amount, in his judgment, proportionate to the quantities of these various items of Work not completed at the time of payment. Payment in full shall not be made until such time as all the Work involved in furnishing and installing RCP complete and in accordance with these Specifications is approved by the Engineer. The retention provided by this Section 17-9 shall be in addition to the retention required by Section 9-7, "Progress Payments and Retentions".

SECTION 18 –POLYVINYL CHLORIDE (PVC) PIPE

18-1 General

This work shall consist of furnishing all labor, materials, tools and equipment, testing, and all incidentals necessary to furnish and install Polyvinyl Chloride (PVC) Pipe at the locations shown on the Plans or specified in the Special Provisions. All Work and materials shall be in accordance with these Specifications, Section 17-2.2, “Polyvinyl Chloride (PVC) Pipe of the City of Fresno Standard Specifications, and as directed by the Engineer. The pipe strength, as designated on the Plans, has been determined for vertical load under average trench conditions. Reference is made to Section 2-4, “Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions”, and Section 2-5, “Pre-bid Tests”. Prior to submitting a bid proposal, the Contractor shall have conducted such tests it determines necessary to satisfy itself as to the soil and trench conditions to be encountered throughout the project, and the effects thereof on the strength and installation requirements of PVC Pipe. No additional payment will be made due to soil or trench conditions differing from that anticipated by the Contractor.

Where PVC Pipe is not shown on the Plans or specified in the Special Provisions and is proposed by the Contractor for use in lieu of RCP as provided in Section 17-2.01, “Pipe Substitutions”, or in lieu of Cast-in Place Pipe as provided in Section 19-2.01, “Pipe Substitutions”, such use must be approved in advance by the Engineer. Approval will depend upon certain flow criteria and restrictions which must be reviewed and which may preclude substitution.

PVC Pipe shall be of the size and strength shown on the Plans or specified in the Special Provisions, or match the internal diameter of the RCP for which substitution is made, whichever is applicable, except that as provided in said Section 17-2.01, PVC Pipe shall not exceed twenty-four (24) inches in diameter. When substituted for RCP, the PVC shall equal or exceed the load bearing capacity of the RCP.

PVC Pipe may only be substituted for twenty four (24) inch diameter Cast-in-Place Concrete Pipe as provided in said Section 19-2.01.

18-2 Materials

Pipe shall be either PVC Gravity Sewer Pipe or PVC Irrigation Pipe conforming to the following specifications. In accordance with the provisions in Section 6-5, "Certificates of Compliance", upon request, the Contractor shall furnish the Engineer with a Certificate of Compliance from the manufacturer of the pipe.

18-2.01 PVC Gravity Sewer Pipe and Fittings

PVC Gravity Sewer Pipe shall be green in color and conform to the standards listed below.

<u>Nom. Pipe Diameter (in.)</u>	<u>A.S.T.M. Designation</u>	<u>SDR/PS Designation</u>
12 - 15	D 3034	SDR 35*
18 - 24	F 679	PS 115**
	* SDR = Standard Dimension Ratio	** PS = Pipe Stiffness

PVC Gravity Sewer Pipe shall be made of PVC compound having a cell classification of 12454-B, or 13364-B conforming to ASTM Designation: D 1784. The fittings shall be made

of PVC compound having a cell classification of 12454-B, 12454-C, or 13343-C. Additives and fillers including, but not limited to, stabilizers, antioxidants, lubricants, colorants, etc., shall not exceed 10 parts by weight per 100 parts of PVC resin in the compound.

PVC Gravity Sewer Pipe, at intervals not to exceed five (5) feet, and Fittings and Couplings, shall be clearly marked externally as follows:

1. Nominal pipe diameter.
2. PVC cell classification.
3. Company, plant, shift, ASTM, SDR, and date designation.

For Fittings and Couplings, the SDR designation is not required.

PVC Gravity Sewer Pipe Fittings and Couplings shall also be green in color and conform to ASTM Designation: F 1336. Fittings and Couplings shall equal or exceed the internal and external strength requirements of the pipe, shall be made by the manufacturer of the pipe being furnished for the Work, and shall have bell and spigot configurations compatible with those of the pipe.

18-2.02 PVC Irrigation Pipe and Fittings

PVC Irrigation Pipe shall be white in color and conform to the standards listed below.

<u>Nom. Pipe Diameter (in.)</u>	<u>ASTM Designation</u>	<u>SDR/PS Designation</u>
12 - 24	D 2241	DR* 32.5
	*DR = Dimension Ratio	

PVC Irrigation Pipe, Fittings, and Couplings shall be manufactured of PVC compound containing not more than 10 parts per 100, by weight, of additives and fillers, including but not limited to, stabilizers, antioxidants, lubricants, and colorants. The PVC compound shall equal or exceed cell classification 12454 conforming to ASTM Designation: D 1784.

PVC Irrigation Pipe, at intervals not to exceed five (5) feet, and Fittings and Couplings shall be clearly marked externally as follows:

1. Nominal pipe diameter.
2. PVC cell classification.
3. Company, plant, shift, ASTM, DR, and date designation.

For Fittings and Couplings, the DR designation is not required.

PVC Irrigation Pipe Fittings and Couplings shall be white in color, shall equal or exceed the internal and external strength requirements of the pipe, shall be made by the manufacturer of the pipe being furnished for the Work, and shall have bell and spigot configurations compatible with those of the pipe.

18-2.03 Joints

Joints for PVC Gravity Sewer Pipe and PVC Irrigation Pipe shall be bell and spigot, sealed with a flexible elastomeric “rubber” gasket. Joint design shall meet or exceed the requirements of ASTM Designation: D 3139 and ASTM Designation: D 3212. Joints shall meet the internal pressure test requirements of Section 18-6, “Testing”.

18-3 Installation

PVC Pipe shall be installed in accordance with Section 8, “Prosecution and Progress of the Work”, and this Section 18-3.

18-3.01 Excavation

Excavation for installation of PVC Pipe shall conform to the requirements of Section 14-3, “Trench and Structure Excavation”, and to the following. The contractor shall exercise precautionary measures during trenching operations by providing adequate shoring or other devices to minimize the development of adverse wide trench conditions in the pipe embedment zone.

18-3.01.1 Trench Widths

Trench widths shall conform to the following dimensions unless otherwise shown on the Plans, specified in the Special Provisions, or approved by the Engineer:

<u>Pipe Size (I.D.)</u>	<u>Max. Width at Top of Pipe Greater Than Pipe O.D.</u>	<u>Min. Width at Springline, Each Side of Pipe</u>
Less than 18”	24”	6”
18” to 24” inclusive	30”	8”
27” to 39” inclusive	36”	9”
42” to 60” inclusive	Pipe O.D.	12”

The width of the trench shall not be greater than the maximum indicated for the particular pipe size at or below the top of the pipe. Where the trench width exceeds the maximum indicated for the particular pipe size, the Contractor shall comply with the requirements of Section 18-3.05.1, “Special Initial Backfill”. The width of the trench above the top of the pipe may be as wide as necessary for sheeting and bracing, and for proper installation of the Work.

As specified in said Section 14-3, in trenches where rock, hardpan, wet, spongy, or other material unsuitable for pipe bedding is encountered in the trench bottom, as determined by the Engineer, the unsuitable material shall be over-excavated to the depths specified in said Section 14-3 for the type of material encountered. The over-excavated space shall be backfilled with bedding as provided in Section 18-3.02, “Bedding”.

The cost of excavation of trenches, including trench over-excavation, shall be considered as included in the price paid for PVC Pipe, and no additional payment will be made therefor.

18-3.02 Bedding

Where trenches must be over-excavated pursuant to Section 14-3, "Trench and Structure Excavation", due to encountering unsuitable pipe bedding conditions during trench excavation, Bedding for PVC Pipe shall be furnished and placed in accordance with Section 15-3, "Bedding". Where over-excavation is not required, Bedding shall be provided in the same manner as required for excess trench widths in conformance with Section 15-4.02.2(A), "Special Initial Backfill, PVC Pipe". The cost for providing Bedding shall be considered as included in the price paid for PVC Pipe, and no additional payment will be made therefor.

18-3.03 Pipe Laying

Pipes shall be laid in conformity with the prescribed lines and grades obtained from survey stakes set by the Engineer. The pipe shall be laid uphill from structure to structure with the bell end up-grade, unless otherwise approved by the Engineer. During jointing operations, the two sections to be joined shall be firmly placed together in such a manner that the bell or groove end of the pipe fits truly and snugly over the tongue end. The tongue end shall be inserted into the bell end up to the manufacturer's index mark provided on the pipe. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. Lubrication shall be applied to the joint in accordance with the manufacturer's recommendations. After each section of pipe has been laid to line and grade, it shall be joined to the preceding section as required in Section 18-2.03, "Joints". After jointing procedures have commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with the applicable provisions of Section 15-4.02.1, "Initial Backfill, RCP", and Section 18-3.03.1, "Floatation Prevention".

18-3.03.1 Floatation Prevention

The Contractor shall take appropriate measures to prevent floatation of the pipe during all backfill operations. The entire length of the pipe shall be anchored by methods approved by the Engineer to prevent any vertical or horizontal movement of the pipe during such operations. Anchors shall cause no deflections in or damage to the pipe, and shall be removed once the pipe is sufficiently stable in position after sufficient backfill has been placed. The Contractor shall provide pipe grade control during installation and make any adjustments in pipe position to conform to lines and grades shown on the Plans before placement of final backfill. Performance of Floatation Prevention shall in no way relieve the Contractor of the responsibility to excavate and re-lay pipeline found by tests as provided in Section 18-6, "Testing", to be out of conformance with the lines and grades shown on the Plans. The cost for providing Floatation Prevention shall be included in the price bid for PVC Pipe, and no additional payment will be made therefor.

18-3.04 Construction Joints

Reference is made to the Standard Plan for Construction Joints. Whenever two sections of pipe are to be connected where standard joints are not available, such as joining PVC pipe to RCP, a concrete collar shall be constructed around the full periphery of the pipes to be joined

and extending one (1) foot on both sides of the joint. The collar shall be of a minimum thickness equal to that of the thicker pipe, but in no case less than four (4) inches thick. The interior of the joint shall be smoothed with cement mortar and brushed. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to construction of the collar.

18-3.05 Initial Backfill and Compaction

Initial Backfill shall be placed and compacted from the top of bedding to one (1) foot above the outside top of pipe, in compliance with Section 15-4.02, "Trench Backfill; Pre-cast Pipe", Section 15-4.02.2, "Initial Backfill, PVC Pipe", and Section 15-8, "Compaction".

18-3.05.1 Special Initial Backfill

As provided in Section 18-3.01.1, "Trench Widths", where trench widths exceed the maximum dimensions indicated in said Section 18-3.01.1, special initial backfill shall be provided in conformance with Section 15-4.02.2(A), "Special Initial Backfill, PVC Pipe". No additional payment will be made for Special Initial Backfill.

18-3.06 Slurry Cement Initial Backfill

In lieu of providing shaped or sand bedding as required by Section 15-3, "Bedding", or sand initial backfill as required by Section 15-4.02.2(A), "Special Initial Backfill, PVC Pipe", with the approval of the Engineer, the Contractor may provide slurry cement as bedding and/or initial backfill conforming to Section 15-2.03, "Slurry Cement Backfill". Slurry cement shall be consolidated using approved vibrators. When used as either Bedding or Initial Backfill, the Contractor shall comply with the requirements of Section 18-3.03.1, "Floatation Prevention". Unless otherwise specified in the Special Provisions, no additional payment will be made for Slurry Cement Initial Backfill.

18-3.07 Final Backfill and Compaction

Final Backfill for the remainder of the trench from one (1) foot above the outside top of pipe to the surface shall be performed in accordance with Section 15-4.03, "Final Backfill, Pre-cast Pipe". Compaction shall comply with Section 15-8, "Compaction".

18-3.08 Minimum Cover (depth)

Unless otherwise shown on the Plans or specified in the Special Provisions, where it is necessary to deviate from the pipe elevations shown on the Plans, as determined by the Engineer, PVC Pipe shall be placed such that the minimum cover over the pipe shall be three (3) feet, as measured from the lowest finish roadway elevation or ground surface elevation for non-roadway installations, except that within retention basins, the minimum cover over the pipe shall be four (4) feet.

In cases where the minimum cover over the pipe as above specified may be reduced to less than the specified amounts, the Contractor shall provide and place a higher strength pipe and/or bedding as directed by the Engineer for the conditions encountered. The additional cost of a higher strength class of pipe or special bedding will be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work", but only when such change is directed by the Engineer.

18-4 Curved Alignments

Pipes shown on the Plans to be laid on a radius shall be placed in strict conformance with the alignment and grade determined by marker stakes set by the Engineer. Unless otherwise shown on the Plans, curvature shall be accomplished by straight line runs of pipe connected by angle fittings prefabricated by the pipe manufacturer. Deflection at individual joints will not be permitted, except in cases where field conditions require unanticipated shifts in alignment or grade. In cases where field conditions require unanticipated shifts in alignment or grade, said shift shall be accomplished at a curvature approved by the Engineer such that the pipe and pipe joints shall be deflected no greater than the manufacturer's maximum recommended deflection. At locations where maximum recommended deflection angles must be exceeded, the Contractor shall install pre-manufactured angles as approved by the Engineer. Angles shall conform to the pipe fittings requirements of Section 18-2, "Materials". Unanticipated angles will be paid for at the unit price bid for fittings. If no bid item was provided therefor, unanticipated angles will be measured in length and paid for at the unit price bid per linear foot of pipe, and no additional payment will be made therefor, including any down time awaiting arrival of the required angles.

18-5 Protection of Pipe

The requirements of this Section 18 shall not relieve the contractor of the provisions of Section 7-14, "Contractor's Responsibility for Work and Materials". The contractor shall exercise every precaution against damage to the pipe, including damage from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer.

18-6 Testing

Where shown on the Plans, specified in the Special Provisions, or when directed by the Engineer, PVC Pipe shall be tested for leakage and deformation, and video inspected for line, grade, damage, and debris. Any portion of the pipeline failing any of the tests or video inspection shall be dug up and repaired/replaced/re-laid. Failed locations shall be re-tested and re-videoed after repairs are made. Where testing or video inspection are not shown on the Plans or specified in the Special Provisions, they shall be at the discretion of the Engineer; any one or any combination, including all three, of the tests and video inspection may be required. All tests and video inspections shall be conducted after trenches have been backfilled and compacted, but before replacement of permanent AC Pavement. Tests and video inspections, when required by the Plans, Special Provisions, or the Engineer to be furnished by the Contractor, shall conform to the following:

Deformation testing shall be by mandrel or rigid ball method in accordance with Section 306-1.2.12, "Field Inspection for Plastic Pipe and Fittings", of the "Greenbook" Standard Specifications for Public Works Construction, as amended. Deformation shall not exceed five (5) percent of the internal pipe diameter. The deformation test shall be conducted at the latest time possible, but before replacement of permanent AC pavement to allow for maximum deformation to occur. A "rubber flush ball" does not meet the requirements for deflection testing.

Testing for leakage shall be done by an air pressure test conducted in accordance with Section 306-1.4.4, “Air Pressure Test”, for gravity sanitary sewers, of said “Greenbook”, as amended. The allowable time required for a pressure decrease from 3.5 psig to 3.0 psig shall be thirty (30) minutes for all pipe diameters.

A closed circuit television inspection shall be conducted on the interior of the newly installed pipe. If either or both of the mandrel/rigid ball and air test are required, the video inspection shall follow and not precede such tests. A DVD disc showing the initial video inspection, as well as any subsequent video inspections, shall be furnished to the District at no cost.

Where deformation and/or air pressure tests are specified or are required by the Engineer, in lieu of these tests the Contractor may, with the approval of the Engineer, elect to place Slurry Cement Backfill conforming to Section 18-3.06, “Slurry Cement Initial Backfill”. The video inspection may still be required. No additional compensation will be paid for the alternative method of initial backfill.

When any test or combination of tests prescribed by this Section 18-6, “Testing”, are required on the Plans or specified in the Special Provisions, the cost thereof shall be paid for as provided in the Special Provisions. If any test or combination of tests are required by the Plans or the Special Provisions and no method of payment is prescribed in either, the cost thereof shall be considered as included in the price bid for PVC Pipe, and no additional payment will be made therefor. When any test or combination of tests are not required by the Plans or Special Provisions, but are required by the Engineer, the cost thereof shall be paid for as Extra Work in accordance with Section 4-4, “Extra Work” and Section 9-5, “Payment for Extra Work”. Tests will be paid for only once. All retests shall be performed at the expense of the Contractor, including any retests where the cost of the initial tests was included in the price of the PVC Pipe.

When any test or combination of tests prescribed in this Section 18-6, “Testing”, are required by the Plans, Special Provisions, or the Engineer, unless otherwise specified in the Special Provisions or specifically approved by the Engineer in writing, no partial or other payment will be made for PVC Pipe until the test or tests so required have been successfully completed and accepted by the Engineer.

18-7 Measurement and Payment

The length of PVC pipe to be paid for will be the horizontal length measured by the Engineer exclusive of structures, except that pipe placed in sloped areas of retention basins or other substantially inclined surfaces, measurement shall be based on slope lengths, exclusive of structures. When pipes enter a structure at an angle different from a right angle and are cut to conform to the faces of the structure or of a slope, the quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or to the face of the slope. The price paid per lineal foot of PVC Pipe shall include full compensation for furnishing all labor, materials, tools, equipment, and doing all the work involved in installing the pipe in place, including but not limited to excavation and backfill, testing, and all incidental work. Where PVC Pipe is substituted for RCP, payment will be made at the unit price bid for RCP.

Unless otherwise specified in the Special Provisions, fittings will be measured and paid for on an “each” basis at the bid price therefor. If no bid item has been provided, the cost for fittings shall be considered as included in the lineal foot cost of pipe, and no additional payment will be made therefor, except as provided in Section 18-4, “Curved Alignments”.

Reference is made to Section 33, “Miscellaneous Facilities and Operations”. Where a bid item is provided for said Section 33, the cost of constructing concrete collars shall be included therein. If no such bid item is provided, the cost for concrete collars shall be considered as included in the per lineal foot cost of PVC Pipe requiring the collar, and no additional payment will be made therefor.

18-8 Payment Retention

The placement of PVC Pipe includes, but is not limited to, various items of work such as excavation, pipe installation, backfilling and moisture conditioning, compaction, and clean-up. Section 18-7, “Measurement and Payment”, is hereby modified to provide for the retention of up to fifty (50) percent of the in-place value of PVC Pipe, or fifty (50) percent of the in-place value of RCP in the case of pipe substitutions as provided in Section 17, “Reinforced Concrete Pipe”, said percentage to be determined by the Engineer in an amount, in his judgment, proportionate to the quantities of these various items of Work not completed at the time of payment. Payment in full shall not be made until such time as all the Work involved in furnishing and installing PVC Pipe, complete and in accordance with these Specifications, is approved by the Engineer. The retention provided by this Section 18-8 shall be in addition to the retention required by Section 9-7, “Progress Payments and Retentions”.

SECTION 19 - CAST-IN-PLACE CONCRETE PIPE

19-1 General

This Work shall consist of furnishing all labor, materials, tools, and equipment for constructing Cast-in-Place Concrete Pipe at the locations and of the size indicated on the Plans. All Work shall be in accordance with the Plans, the Special Provisions, and these Specifications.

19-2 Materials

Concrete used in the construction of non-reinforced Cast-in-Place Concrete Pipe shall conform to Section 12, "Portland Cement Concrete; Cement Mortar". The concrete shall be either Class "A" (6-sack mix), Class "B", (5-sack mix), or an alternative mix design approved by the Engineer, and shall develop a minimum compressive strength of 2800 psi at 28 days as determined in conformance with Section 19-13, "Concrete Tests". Cement mortar used for patching, smoothing or repair of Cast-in-Place Concrete Pipe shall also conform to the requirements of said Section 12.

Admixtures shall be used only in conformity with the requirements of Section 12-2.06, "Admixtures".

Coarse and fine aggregate gradation shall conform to the requirements of Section 12-2.03, "Coarse Aggregate", and 12-2.04, "Fine Aggregate", and these coarse-aggregate maximum size limitations:

<u>Pipe Diameter</u>	<u>Max. Agg. Size</u>
24" to 48"	1" max.
48" and over	1½" max.

Coarse and fine aggregate shall also conform to ASTM Designation: C-33 as revised.

19-2.01 Pipe Substitutions

Reinforced Concrete Pipe (RCP) conforming to Section 17, "Reinforced Concrete Pipe (RCP)", may be substituted for Cast-in-Place Concrete Pipe at any location or size.

PVC Gravity Sewer Pipe and PVC Irrigation Pipe conforming to Section 18, "Polyvinyl Chloride (PVC) Pipe", may be substituted for twenty four (24) inch diameter Cast-in Place Concrete Pipe only. However, substitution using PVC is subject to approval by the District depending on certain flow restrictions that may apply.

Plastic Pipe conforming to Section 22, "High Density Polyethylene (HDPE) Pipe", may only be substituted for twenty four (24) inch diameter Cast-in-Place Concrete Pipe, and only at locations shown on the Plans or specified in the Special Provisions as a permitted substitution, unless otherwise specifically approved by the Engineer in writing.

Substituted pipe shall have the same internal diameter as specified for the Cast-in-Place Concrete Pipe. The pipe strength class shall be as shown on the Plans, as specified in the Special Provisions, or as determined by the Engineer.

Joints on RCP substituted for Cast-in-Place Concrete Pipe shall be rubber gasket or cement mortar, as shown on the Plans or specified in the Special Provisions. Joints for PVC Pipe and HDPE Plastic Pipe substituted for Cast-in-Place Concrete Pipe shall be rubber gasket.

Payment for substituted pipe shall be at the unit price bid for Cast-in-Place Concrete Pipe, and no additional payment will be made therefor.

19-3 Nominal Internal Diameter

The nominal internal diameter of Cast-in-Place Pipe shall be the size indicated on the plans. The actual internal diameter of the pipe at any point shall not be more than five (5) percent less than the nominal internal diameter, and the actual internal cross-sectional area of the pipe at any point shall not be less than the cross-sectional area of a circle computed from the nominal internal diameter. The contractor may be allowed to construct pipe of larger sizes than that specified on the plans; however, any and all deviations in sizes from that specified must be approved by the Engineer.

19-4 Wall Thickness

Minimum wall thickness for the various sizes of pipe shall conform to the following table:

<u>Internal Diameter</u>	<u>Minimum Wall Thickness for Pipe</u>	<u>Internal Diameter</u>	<u>Minimum Wall Thickness of Pipe</u>
24"	2½"	66"	6½"
30"	3"	72"	7"
36"	3½"	78"	7½"
42"	4"	84"	8"
48"	5"	90"	8½"
54"	5½"	96"	9"
60"	6"		

19-5 Excavation

Excavation shall conform to the requirements of Section 8, "Prosecution and Progress of the Work", and Section 14-3, "Trench and Structure Excavation". In trenches where wet, spongy, or other unsuitable material is encountered in the trench bottom, the trench shall be over-excavated to the depth indicated in said Section 14-3, or to such other depth as determined by the Engineer to be necessary to remove the unsuitable material. The over-excavated space shall be backfilled with bedding in conformance with Section 19-6, "Bedding".

19-6 Bedding

Unless otherwise specified in the Special Provisions, bedding shall conform to the requirements of Section 15-3, "Bedding", Section 19-7, "Pipe Construction, Feasibility", and 19-8, "Pipe Construction".

19-7 Pipe Construction, Feasibility

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". The District makes no guarantee as to the types of soil or of soil conditions existing within the project limits. Prior to submitting a bid proposal, the Contractor shall have performed whatever soils or other tests it deems necessary to make itself fully aware of the soil types or conditions which may prevail throughout the project site. Tests so performed shall be conducted at the Contractor's expense, and no compensation will be paid therefor. Where the District has conducted soils investigations and has made such report available to prospective bidders, the data provided therein is for the Contractor's information and convenience only. No representation is made thereby as to the feasibility of constructing Cast-in-Place Concrete Pipe.

Where unstable trench conditions are encountered, the Contractor shall attempt to stabilize the trench by shoring or, wherever practical, by sloping the sides of the trench above the top of the pipe. In accordance with Section 15-3, "Bedding", where unsuitable material is encountered in the trench bottom, the trench shall be over-excavated and backfilled with Bedding as provided in said Section 15-3. No additional payment will be made for providing stabilization or Bedding.

Where the Engineer determines, due to unstable trench conditions or other reasons, that it is not feasible to place Cast-in-Place Concrete Pipe, the Contractor shall place reinforced concrete pipe conforming to Section 17, "Reinforced Concrete Pipe (RCP)" of the same size and strength class indicated on the Plans or Bidder's Proposal, or as specified in the Special Provisions. The Contractor will be paid at the unit price bid for Cast-in-Place Concrete Pipe regardless if RCP had to be installed due to infeasibility, and no additional payment will be made therefor.

Construction of Cast-in-Place Concrete Pipe may be considered as not feasible when the trench walls are not stable below the upper 220° of the pipe periphery. The Engineer, however, shall be the sole judge as to the feasibility of constructing Cast-in-Place Concrete Pipe as shown on the Plans.

19-8 Pipe Construction

Pipes shall be constructed in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. Reference is made to Section 14-3, "Trench and Structure Excavation", and Section 15-3, "Bedding". All surfaces against which concrete is to be placed shall be free from standing water, mud and debris and shall be firm enough to prevent contamination of the concrete by earth or other foreign material. Absorptive surfaces against which concrete is to be placed shall be moistened thoroughly so that the moisture will not be drawn from the freshly placed concrete.

When placing operations cease or are delayed for any reason for more than thirty (30) minutes, the end of the pipe shall be left rough with a slope of approximately thirty (30) degrees and the ends of the pipe shall be securely closed by a plastic membrane or other acceptable material to prevent excessive dehydration of the concrete already placed. The joint so formed when placing operations again commence shall conform to the requirements of Section 19-9, "Construction Joints".

Cast-in-Place Concrete Pipe shall be constructed in one placement around the complete periphery of the pipe by means of a traveling pipe-casting-machine approved by the Engineer. The bidder may be required to furnish evidence of successful experience and in-service performance of pipe produced by the pipe-casting machine under similar working conditions.

Pipes twenty-four (24) to thirty (30) inches in diameter shall be cast-in-place in a manner such that as forms are lapped, the lap ridges formed in the interior walls of the pipe face downstream in the direction of flow. Pipes thirty-six (36) inches in diameter and larger shall be cast in the downstream direction, unless otherwise approved or directed by the Engineer.

Forms used in the work shall be clean and reasonably free of concrete adhering to the surface of the forms from previous operations. Forms used shall be of sufficient strength to withstand vibrating or tamping the concrete and which will provide interior dimensions of the pipe in accordance with the tolerances of Section 19-3, "Nominal Internal Diameter". Damaged forms shall not be used in the work and shall be removed from the job site.

19-9 Construction Joints

Where construction of Cast-in-Place Concrete Pipe stops short of a manhole or other structure and construction will continue at a later time, or where Cast-in-Place Concrete Pipe is to be jointed to pre-cast pipe, the resulting joint shall be completed by constructing a concrete collar around the joint. Reference is made to the Standard Plan for Construction Joints. This collar shall extend one (1) foot each side of the joint gap around the full periphery of the pipe, and shall be equal in thickness to the wall thickness of the thicker pipe, but in no case less than four (4) inches. The gap between the two pipes to be joined shall not be greater than half the diameter of the pipes joined. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to constructing the collar. The collar shall be formed on the inside to assure a straight and smooth transition between the joined pipes, and the concrete shall be tamped or vibrated into the joint to assure all voids are filled. When completed, any projections on the interior of the joint shall be removed and troweled smooth with mortar. The cost of constructing concrete collars shall be considered as included in the cost of the various items requiring construction of concrete collars, and no additional payment will be made therefor.

19-10 Curing

Reference is made to Section 19-11, "Finish". Immediately after casting and finishing of the exposed exterior surface of the pipe, it shall be cured by covering with an approved polyethylene or plastic membrane which shall be anchored sufficiently to keep the surface covered.

Unless the pipe terminates at a structure which is closed to the air, the ends of the pipe, as well as any other openings, shall be securely closed with an impermeable membrane for a minimum of seven (7) days or until the structure is constructed, if sooner. Precaution shall be used to make the structure reasonably air-tight for a minimum of seven (7) days, except when work is taking place inside the pipe.

19-11 Finish

The exterior exposed surface of the pipe shall have a steel screeded finish. A hand trowel or wood float shall be used, as construction progresses, to smooth areas not sufficiently smoothed by the pipe-casting machine. All finishing of the exterior shall be accomplished immediately as pipe construction progresses and shall be substantially free of fractures, cracks, and roughness.

The interior surface of the pipe shall be equivalent to a steel screeded finish. All honey-combed or minor voids shall be chipped out, filled and smoothed with cement mortar conforming to Section 12-8, "Cement Mortar". Major voids shall be repaired with Portland Cement Concrete, Class A or B, conforming to Section 12, "Portland Cement Concrete; Cement Mortar", in a manner prescribed by the Engineer.

Excessive longitudinal ridges along the sides of the interior of the pipe shall be chipped back and smoothed with cement mortar, as directed by the Engineer.

Form lap offsets exceeding the limits established below shall be chipped back and smoothed with mortar.

<u>Pipe Diameter</u>	<u>Maximum Offset</u>
24" – 30"	3/8"
36" – 42"	1/2"
48" – 66"	5/8"
72" – 90"	7/8"
96"	1"

Interior finishing shall be accomplished as soon as possible or practical after placing of the pipe and shall be subject to the provisions of Section 19-17, "Payment Retention".

19-12 Backfill and Compaction

Backfill shall comply with Section 15-4.01, "Trench Backfill, Cast-in-Place Concrete Pipe". Compaction shall comply with Section 15-8, "Compaction".

19-13 Concrete Tests

Reference is made to Section 6-3, "Samples and Tests", and the concrete strength requirements of Section 19-2, "Materials". For quality control, during the concrete pouring operations the Contractor, if requested, shall assist the Engineer in securing three (3) standard test cylinders for each fifty (50) cubic yards, or portions thereof, per day. Test cylinders shall be cured by approved methods. Cylinders shall be tested for strength by a recognized testing laboratory. The cost of such tests will be at the Contractor's expense and certified copies of the results will be submitted to both the Contractor and the Engineer. One of the cylinders will be tested at the end of seven (7) days; one of the test cylinders will be tested at the end of twenty-eight (28) days; and one of the test cylinders will be held to be tested at the discretion of the Engineer, all in accordance with the procedures established by the ASTM Designation: C39.

In accordance with Section 6-5, "Certificates of Compliance", if requested by the Engineer the Contractor shall furnish certificates of compliance from the concrete supplier certifying that the material conforms to the requirements of Section 19-2, "Materials".

19-14 Hydrostatic Tests

When hydrostatic testing is specified on the Plans or in the Special Provisions, and when the concrete has reached a compressive strength of twenty-eight hundred (2,800) pounds per square inch, the Contractor shall test the pipe with water to the specified maximum operating head. The pipeline may be tested in one length or in sections, as approved by the Engineer. Each test shall be maintained for twenty-four (24) hours at the specified maximum operating head.

All leaks creating wet spots at the soil surface, or otherwise exposed by the test, shall be repaired by and at the expense of the Contractor. Leakage loss during this test period shall not exceed one thousand (1,000) gallons per inside diameter inch per mile of pipe installed, for a period of twenty-four (24) hours. Where leakage exceeds the allowable limit, the Contractor shall discover the cause and remedy it before the pipeline is offered for retesting and acceptance. If the leakage is less than the allowable, and individual leaks are observed, such leaks shall be repaired in a manner satisfactory to the Engineer.

The Contractor shall comply with the requirements of Section 7-10, "Permits, Licenses, and Fees", and Section 7-32, "Electrical and Water Service", for water to be used for hydrostatic tests. All costs for water and any required permits shall be included in the cost of providing the tests, and no additional payment will be made therefor.

19-15 Protection of Pipe

The Contractor shall exercise every precaution against damage to the pipe including damage caused from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer. The requirements of this Section 19-15 shall not relieve the contractor of the provisions of Section 7-14, "Contractor's Responsibility for Work and Materials".

19-16 Measurement and Payment

The length of Cast-in-Place Concrete Pipe to be paid for will be the horizontal length designated by the Engineer exclusive of structures, except that pipe placed in sloped areas of retention basins or other substantially inclined surfaces, measurement shall be based on slope lengths, exclusive of structures. When pipes enter a structure at an angle different from a right angle, and are cut to conform to the faces of the structure or of a slope, the quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or the face of the slope.

The price paid per lineal foot of pipe shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in installing the pipe in place, including but not limited to excavation and backfill, finishing, joint construction, and for all tests as herein specified except the hydrostatic test.

Hydrostatic tests will be paid for as specified in the Special Provisions, and shall include full compensation for furnishing all labor, materials, water, tools and equipment and doing all the work involved in performing the required hydrostatic tests as herein specified. Where no method of payment is provided therefor, the cost of providing hydrostatic testing shall be considered as included in the price bid for Cast-in-Place Pipe, and no additional payment will be made therefor.

19-17 Payment Retention

The placement of Cast-in-Place Concrete Pipe includes, but is not limited to, various items of work such as excavation, pipe installation, pipe patching and cleaning, backfilling, compaction and clean-up. Section 19-16, "Measurement and Payment", is modified hereby to provide for the retention of up to fifty (50) percent of the in-place value of Cast-in-Place Concrete Pipe, or any substitutions allowed by this Section 19, said percentage to be determined by the Engineer in an amount, in his judgment, proportionate to the quantities of these various items of Work not completed at the time of payment. The retention provided by this Section 19-17 shall be in addition to the retention required by Section 9-7, "Progress Payments and Retentions".

SECTION 20 - JACKING PIPE

20-1 General

This Work shall consist of furnishing, boring, and jacking into place reinforced concrete pipe at the locations and between the limits shown on the Plans or specified in the Special Provisions, and in accordance with these Specifications.

Reference is made to Section 7-10, "Permits, Licenses, and Fees", and Section 7-18, "Worker Protection From Caving Ground in Excavations". The Contractor shall obtain the required permit from the State Division of Occupational Safety and Health and pay all associated costs. The District shall provide at its expense the Tunnel Gas Classification for the site. A copy of the jacking permit or agreement from the owner of the facility under which the pipe is being jacked or bored will be provided the Contractor, who shall abide with all the requirements therein. If the Work, or any portion thereof, is to occur in public rights of way, the Contractor shall also obtain the required encroachment permit from the jurisdictional agency and comply with the requirements thereof.

The Contractor shall comply with Section 7-19, "Worker Protection From Toxic or Explosive Gases; Confined Spaces Entry", Section 7-20, "Trenches and Excavations-Hazardous Waste", and Section 7-21, "Protection of Archeological, Cultural, Paleontological Resources".

Reinforced concrete pipe shall be of the size and class shown on the Plans or specified in the Special Provisions, except that the class of pipe designated has been determined for vertical loads only. Additional facilities, reinforcement, or strength of pipe required to withstand jacking pressure shall be determined and furnished by the Contractor at its expense. Should the jacking permit or agreement from the owner of the facility under which the pipe is being jacked require a different class or type of pipe, the more restrictive requirements of either these Specifications or the permit or agreement shall apply.

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". Prior to submitting a bid proposal, the Contractor shall have conducted such tests it determines necessary to satisfy itself as to the soil conditions to be encountered throughout the project, and the effects thereof on the excavation requirements of jacking and receiving pits and on jacking and boring operations. No additional payment will be made due to soil conditions differing from that anticipated by the Contractor.

20-2 Materials

Unless otherwise shown on the Plans or specified in the Special Provisions, or unless otherwise required by a permit issued by a jurisdictional agency, RCP to be installed in the Work shall conform to ASTM Designation: C 76, as amended or revised. Upon request, the Contractor shall furnish to the Engineer a Certificate of Compliance from the manufacturer of the pipe in accordance with the provisions in Section 6-5, "Certificates of Compliance". Reinforced concrete pipe shall conform to applicable portions of Section 17, "Reinforced Concrete Pipe (RCP)". Pipe shall be constructed such that no bells protrude from the outside periphery of the pipe.

Sleeves for joints shall be manufactured of galvanized steel, stainless steel, or fiberglass, sufficient in strength to withstand all loads, and which will maintain a water-tight joint.

Conductor pipe, if used, shall be butt welded commercial grade steel sheets conforming to ASTM Designation: A-1011, or steel plates conforming to ASTM Designation: A-283. Conductor pipe shall be of sufficient thickness and strength to withstand vertical loads as well as pressure from jacking machinery.

Conductor pipe spacers for supporting the carrier pipe, and pipe banding, shall be stainless steel and specifically designed and fabricated for the specific project and application for which they are furnished.

20-3 Joints

Joints shall be rubber gasket, and shall conform to the requirements of Section 17-3.02 “Rubber Gasket Joints”, except where joints must withstand internal hydrostatic pressure above those specified by said Section 17-3.02. In such cases, the joints and the elastomeric seals shall comply with the requirements specified in the Special Provisions or shown on the Plans.

If the annular space remaining in the joints on the inside of the pipe exceeds one (1) inch, the space shall be filled with an epoxy grout or other material approved by the Engineer for the full periphery of the joint and finished smooth and flush with the interior walls of the pipe. For pipes thirty six (36) inches in diameter or larger, filling and finishing annular spaces shall be accomplished after the entire installation is completed.

20-4 Excavation of Jacking and Receiving Pits

Excavation of jacking and receiving pits, the Contractor shall conform to the requirements of Section 14, “Trench and Structure Excavation, Retention Basin Excavation and Grading”. The Contractor shall also comply with the provisions of the Construction Safety Orders and the Tunnel Safety Orders of the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal OSHA), and to any other applicable safety codes. The tunnel site (jacking location) will be classified as to gas hazard by the California Department of Industrial Relations. The classification documents issued by the State will be included in the appendix of the Contract Special Provisions. An excavation Permit will be required from Cal OSHA in accordance with Section 7-18, “Worker Protection From Caving Ground in Excavations”.

For excavations greater than twenty (20) feet in depth, in accordance with Article 6, Subchapter 4, Chapter 4 (Construction Safety Orders), Division 1, Title 8, of the California Code of Regulations, detailed excavation plans shall be prepared and signed by a Registered Civil or Structural Engineer showing all sloping, shoring, bracing, or other protective measures to be provided for worker protection. Such plans shall be submitted to the Engineer for review and approval prior to beginning any excavation.

The Contractor and any subcontractor involved with the jacking operations shall make themselves fully aware of the foregoing requirements and shall be prepared to attend a pre-job

safety meeting with a Cal OSHA representative. The Contractor shall present its safety program at this meeting.

20-5 Jacking and Boring

Pipe shall be jacked in conformity with the prescribed lines and grades obtained from stakes set by the Engineer. Excavation for the pipe shall be accomplished by boring or by hand digging. Jetting with water will not be permitted.

The excavated hole, whether bored or hand dug, shall not be more than one-tenth (0.1) foot greater than the outside limits of the pipe, or where the Contractor elects to use a conductor pipe, no more than one-tenth (0.1) foot greater than the outside limits of the conductor.

If the nature of the material is such that caving will likely continue to occur and which will result in a greater space as above specified, a metal shield or jacking head shall be installed which extends a minimum of eighteen (18) inches ahead of the jacked pipe or conductor. The metal shield shall cover a minimum of the upper one-half ($\frac{1}{2}$) of the periphery of the jacked pipe or conductor. Excavation shall not proceed beyond the shield.

Where ground conditions at the face of the jacking pit are such that sloughing or caving is likely to occur at the face of the excavation upon commencement of jacking operations, the face of the pit shall be made stable so that an excessive void is not carried with the face of the excavation for the length of the pipe. Prevention may include installing solid sheathing at the jacking portal.

Cavities or voids outside the limits specified above, regardless of cause, shall be filled with sand, soil, cement, or cement mortar, under pressure, as directed by the Engineer. The method by which pressure grouting is to be performed shall be approved by the Engineer. As a minimum, the pipe being jacked shall be furnished with pre-installed fittings suitable for attachment to grout pumping equipment. Grout connections shall be placed along the top of the pipe at intervals no greater than five (5) feet.

Immediately after completion of jacking or boring operations, lean grout shall be injected through the grout connections in such a manner as to completely fill all voids outside the jacked pipe resulting from the jacking or boring operations. The lean grout shall be composed of a mixture of one (1) part Portland Cement conforming to Section 12-2.01, "Cement", and not more than four (4) parts clean sand by volume, placed at low pressure. Sand used for grout shall be of such fineness that one hundred (100) percent will pass a No. 8 sieve and not less than thirty five (35) percent will pass a No. 50 sieve. After completion of grouting, the grout connections shall be closed with cast iron threaded plugs.

The Contractor shall monitor the horizontal and vertical grades of the pipe during operations and make corrections as necessary. At the completion of operations, the jacked pipe shall not exceed the alignment and grade shown on the Plans by the following amounts:

Horizontal Alignment: $\pm 1\%$ of the distance from the jacking point.

Vertical Grade: 0.00 foot in the up direction; 0.50 foot in the down direction.

The Contractor shall pay to the District for liquidated damages the sum specified in the Special Provisions for each and every one-tenth (0.1) foot of variation in excess of the maximum tolerances allowed. This sum shall not be considered a penalty by either party, but compensation to the District for future undeterminable operations or maintenance costs due to the misalignment.

The Contractor shall monitor soil and groundwater conditions encountered during excavation and boring operations, and provide any necessary seepage control to prevent damage to the Work or risks to the safety of workers or others who must enter the excavation or boring operations area.

20-6 Hydrostatic Test

Where shown on the Plans or specified in the Special Provisions, or where directed by the Engineer, the Contractor shall conduct a Hydrostatic Test at each location shown, specified, or directed, in accordance with the test provisions of Section 65-1.08, "Laying Siphon and Pressure Pipe", of the Caltrans Standard Specifications, except that the test shall be performed after completion of final backfill but before final surface restoration of the jacking and receiving pits.

Unless otherwise shown on the Plans or specified in the Special Provisions, manholes at both ends of the jacked pipe, and any interconnecting pipe installed between the manholes and the jacked pipe, shall be included in the test. Should leakage from the combined jacked and interconnecting pipes and connecting manholes exceed the allowable limit of leakage computed pursuant to said Section 65-1.08, the Contractor shall undertake measures to seal the pipes and manholes, or take such other actions as are necessary, to eliminate the leakage or reduce it to an amount less than the allowable limit, all of which must be approved by the Engineer. The combined pipes and manholes shall be re-tested in conformance with said Section 65-1.08 after such approved measures are performed.

The Contractor shall comply with the requirements of Section 7-10, "Permits, Licenses, and Fees", and Section 7-32, "Electrical and Water Service", for water to be used for the Hydrostatic Test. All costs for water and any required permits shall be included in the cost of providing the tests, and no additional payment will be made therefor.

Where a Hydrostatic Test is required on the Plans or specified in the Special Provisions, the cost thereof shall be paid for as provided in the Special Provisions. If the Hydrostatic Test is required by the Plans or the Special Provisions and no method of payment is prescribed in either, the cost thereof shall be considered as included in the price bid for Jacking Pipe, and no additional payment will be made therefor. Where a Hydrostatic Test is not required by the Plans or Special Provisions, but is required by the Engineer, the cost thereof shall be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work". Tests will be paid for only once. All retests shall be performed at the expense of the Contractor, including any retests where the cost of the initial test was included in the price of the pipe.

Where a Hydrostatic Test is required by the Plans, Special Provisions or the Engineer, unless otherwise specified in the Special Provisions or specifically approved by the Engineer in writing, no partial or other payment will be made for Jacking Pipe until the Hydrostatic Test as prescribed in this Section 20-6 has been successfully completed and accepted by the Engineer.

20-7 Frac-Out Contingency Plan

When specified in the Special Provisions, a Frac-Out Contingency Plan shall be prepared in accordance with the following provisions and submitted to the Engineer.

For jack-and-bore tunneling activities that use drilling lubricants, the Contractor shall prepare and implement a contingency plan that is intended to minimize the potential for a release of drilling lubricant (frac-out) associated with tunneling activities; provide for the timely detection of frac-outs; and, ensure an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling lubricant. The contingency plan shall include, at a minimum, the following measures:

1. A full-time monitor shall attend all drilling to look for observable frac-out conditions or lowered pressure readings on drilling equipment.
2. If a frac-out is identified, all work shall stop, including the recycling of drilling lubricant. In the event of a frac-out into water, the pressure of water above the tunnel may keep excess mud from escaping through the fracture. The location and extent of the frac-out shall be determined, and the frac-out shall be monitored for 4 hours to determine whether the drilling lubricant congeals (bentonite will usually harden, effectively sealing the frac-out location).
3. If the drilling lubricant congeals, no other actions shall be taken that would potentially suspend sediments in the water column.
4. Surface releases of bentonite shall be allowed to harden and then shall be removed.

The contingency plan shall identify additional measures to be taken to contain or remove the drilling lubricant if it does not congeal.

When a Frac-Out Contingency Plan is required by the Special Provisions, the cost thereof shall be included in the price per lineal foot bid for Jacking Pipe, and no additional payment will be made therefor.

20-8 Backfill and Compaction of Jacking and Receiving Pits, Restoration of Surfaces

Jacking and receiving pits shall be backfilled in accordance with Section 15-4, "Trench Backfill, General", and Section 15-4.01, "Trench Backfill; Cast-in-Place Concrete Pipe", or Section 15-4.02, "Trench Backfill, Pre-Cast Pie", as applicable to the type of pipe to be joined to the jacked pipe. Compaction shall comply with Section 15-8, "Compaction", and the surface restored in accordance with Section 16, "Restoration of Surfaces".

20-9 Measurement and Payment

The length of Jacking Pipe to be paid for will be the horizontal length as shown on the Plans, unless modified by the Engineer due to unforeseen field conditions. The price paid per lineal foot of Jacking Pipe shall include full compensation for furnishing all labor, materials, tools and equipment and doing all the work involved in furnishing and installing the Jacking Pipe in place, including but not limited to, excavating, constructing and backfilling jacking and receiving pits, boring and tunneling, constructing metal shields (jacking heads), and grouting of voids or cavities, furnishing and installing conductor pipe, spacers and pipe bands if used, conducting hydrostatic tests in accordance with Section 20-6, "Hydrostatic Test", where such tests are to be included in the price of the pipe, and obtaining all necessary permits from the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal OSHA). Pipe placed within the jacking and receiving pits to connect the Jacked Pipe to the incoming and outgoing pipe shall be measured and paid for at the bid price for the type of pipe to be connected to.

SECTION 21 - CORRUGATED METAL PIPE (CMP)**21-1 General**

This work shall consist of furnishing all labor, materials, tools, and equipment for installing Corrugated Metal Pipe (CMP) including all necessary fittings and couplings as shown on the Plans, as specified in the Special Provisions, and in accordance with these Specifications, or as directed by the Engineer. Corrugated Metal Pipe shall be supplied and installed in accordance with Section 66, "Corrugated Metal Pipe", of the Caltrans Standard Specifications, latest edition, except as herein modified. Pipe shall be placed in conformity with lines and grades obtained from stakes set by the Engineer.

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". Prior to submitting a bid proposal, the Contractor shall have conducted such tests it determines necessary to satisfy itself as to the soil and trench conditions to be encountered throughout the project, and the effects thereof on the installation requirement of Corrugated Metal Pipe. No additional payment will be made due to soil or trench conditions differing from that anticipated by the Contractor.

21-2 Materials

Corrugated metal pipe and all incidental fittings or couplings shall be steel conforming to the materials requirements of Section 66-3, "Corrugated Steel Pipe", of said Caltrans Standard Specifications.

21-3 Excavation

Excavation for installation of Corrugated Metal Pipe shall conform to the requirements of Section 14-3, "Trench and Structure Excavation", and to the following. The contractor shall exercise precautionary measures during trenching operations by providing adequate shoring or other devices to minimize the development of adverse wide trench conditions in the pipe embedment zone.

Pursuant to said Section 14-3, trenches encountering rock, hardpan, or other material in the trench bottom unsuitable for pipe bedding, as determined by the Engineer, shall be over-excavated four (4) inches and backfilled with bedding material complying with Section 21-4, "Bedding". Where wet, spongy, or other unstable material is encountered, trenches shall be over-excavated twelve (12) inches, or to such other depth as determined by the Engineer to remove unsuitable material, and backfilled with bedding as provided in said Section 21-4. The cost of over-excavating and providing bedding for trenches shall be considered as included in the price paid for Corrugated Metal Pipe, and no additional payment will be made therefor.

21-4 Bedding

Where trenches must be over-excavated pursuant to Section 14-3, "Trench and Structure Excavation", due to unsuitable bedding conditions encountered during trench excavation, Bedding for Corrugated Metal Pipe required shall be furnished and placed in accordance with Section 15-3, "Bedding". The cost for providing bedding shall be considered as included in the price paid for Corrugated Metal Pipe, and no additional payment will be made therefor. Where

over-excavation is not required, Bedding shall be provided in conformance with Section 15-4.02.3, "Initial Backfill, CMP".

21-5 Initial Backfill and Compaction

Initial Backfill shall be placed and compacted from the top of bedding to one (1) foot above the outside top of pipe, in compliance with Section 15-4.02.3, "Initial Backfill, CMP". Compaction shall comply with Section 15-8, "Compaction".

In accordance with said Section 15-4.02.3, use of Slurry Cement conforming to Section 15-2.03, "Slurry Cement Backfill", as bedding or backfill shall only be used with the specific approval of the Engineer or where specified in the Special Provisions. In such cases, the Contractor shall take appropriate measures to anchor the pipe to prevent floating in accordance with Section 21-5.1, "Floatation Prevention".

21-5.01 Floatation Prevention

The Contractor shall take appropriate measures to prevent floatation of the pipe during all backfill operations. The entire length of the pipe shall be anchored by methods approved by the Engineer to prevent any vertical or horizontal movement of the pipe during such operations. Anchors shall cause no deflections in or damage to the pipe, and shall be removed once the pipe is sufficiently stable in position after sufficient backfill has been placed. The Contractor shall provide pipe grade control during installation and make any adjustments in pipe position to conform to lines and grades shown on the Plans before placement of final backfill. Performance of Floatation Prevention shall in no way relieve the Contractor of the responsibility to excavate and re-lay pipeline found to be out of conformance with the lines and grades shown on the Plans. The cost for providing Floatation Prevention shall be included in the price bid for CMP, and no additional payment will be made therefor.

21-6 Final Backfill and Compaction

Final Backfill for the remainder of the trench from one (1) foot above the pipe to the surface shall be performed in accordance with Section 15-4.03, "Final Backfill, Pre-Cast Pipe". Compaction shall comply with Section 15-8, "Compaction".

21-7 Minimum Cover (depth)

Unless otherwise shown on the Plans or specified in the Special Provisions, where it is necessary to deviate from the pipe elevations shown on the Plans, as determined by the Engineer, the pipe shall be placed such that the minimum cover over the pipe shall be three (3) feet, as measured from the lowest finish roadway elevation or ground surface elevation in non-roadway installations, except that within retention basins, the minimum cover over the pipe shall be four (4) feet. Reference is made to Section 18-3.06, "Slurry Cement Initial Backfill" for PVC. Unless otherwise shown on the Plans, specified in the Special Provisions, or approved by the Engineer, no reduction in minimum cover will be allowed when slurry cement is used for Bedding or Initial backfill.

In cases where the minimum cover over the pipe as above specified may be reduced to less than the specified amounts, the Contractor shall provide and place a higher strength class of pipe and/or bedding as directed by the Engineer for the conditions encountered. The additional cost of a higher strength class of pipe or special bedding will be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work", but only when such change is directed by the Engineer.

21-8 Protection of Pipe

The contractor shall exercise every precaution against damage to the pipe including damage caused from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer. The requirements of this Section 21-6 shall not relieve the contractor of the provisions of Section 7-14, "Contractor's Responsibility for Work and Materials".

21-9 Measurement and Payment

The length of Corrugated Metal Pipe to be paid for will be the horizontal length designated by the Engineer exclusive of structures, except that pipe placed in sloped areas of retention basins or other substantially inclined surfaces, measurement shall be based on slope lengths, exclusive of structures. When pipes enter a structure at an angle different from a right angle, and are cut to conform to the face of the structure or of the slope, the quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or to the face of the slope.

At fitting locations, payment will be to the center of the fitting. No extra payment will be made for fittings or couplings unless specifically set forth in the Special Provisions or bid proposal, and the cost of such items shall be included in the price paid per lineal foot of pipe.

The price paid per lineal foot of pipe shall include full compensation for furnishing all labor, materials, fittings, couplings, tools, and equipment and doing all the work involved in installing Corrugated Metal Pipe in place, including but not limited to excavation and backfill.

21-10 Payment Retention

The placement of Corrugated Metal Pipe includes, but is not limited to, various items of work such as excavation, pipe installation, backfilling, compaction and clean-up. Section 21-9, "Measurement and Payment", is hereby modified to provide for the retention of up to fifty (50) percent of the in-place value of Corrugated Metal Pipe, or any substitutions allowed by the Special Provisions, said percentage to be determined by the Engineer in an amount, in his judgment, proportionate to the quantities of these various items of work not completed at the time of payment. The retention provided by this Section 21-10 shall be in addition to the retention required by Section 9-7, "Progress Payments and Retentions".

SECTION 22 – HIGH DENSITY POLYETHYLENE (HDPE) PLASTIC PIPE**22-1 General**

This work shall consist of furnishing all labor, materials, tools and equipment, testing, and all incidentals necessary to furnish and install High Density Polyethylene (HDPE) Plastic Pipe where the use of such pipe is shown on the Plans or specified in the Special Provisions and approved by the local jurisdictional agency as a permitted substitution for RCP as provided in Section 17-2.01, "Pipe Substitutions", or for Cast-in-Place Concrete Pipe as provided in Section 19-2.01, "Pipe Substitutions". Unless shown on the Plans or specified in the Special Provisions as a permitted use, HDPE Pipe will not be permitted. In all cases, approval for use of HDPE shall be obtained from the local jurisdictional agency prior to award of the Contract. Where installation is permitted, all work and materials shall be in accordance with these Specifications and as directed by the Engineer.

HDPE Pipe shall be of the size shown on the Plans or specified in the Special Provisions, or match the internal diameter of the RCP or Cast-in-Place Concrete Pipe for which substitution is made, whichever is applicable, except that as provided in said Section 17-2.01 and Section 19-2.01, HDPE Pipe shall not exceed twenty-four (24) inches in diameter unless specifically approved by the Engineer in writing.

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". Prior to submitting a bid proposal, the Contractor shall have conducted such tests it determines necessary to satisfy itself as to the soil and trench conditions to be encountered throughout the project, and the effects thereof on the requirements for installation of HDPE Plastic Pipe. No additional payment will be made due to soil or trench conditions differing from that anticipated by the Contractor.

22-2 Materials

HDPE Pipe, fittings, and joints shall conform to the following specifications. In accordance with Section 6-5, "Certificates of Compliance", the Contractor shall furnish certificates of compliance as directed by the Engineer.

22-2.01 Pipe and Fittings

HDPE Plastic Pipe and fittings shall be dual-wall, annular exterior corrugations, smooth interior wall, conforming to AASHTO M294, Type S, and the applicable provisions of Sections 64-1.02, "Materials" and 64-1.03, "Pipe Thickness, Stiffness and Unit Weight" of the Caltrans Standard Specifications. Pipe shall be suitable for storm drain applications. Fittings shall be fabricated by the pipe manufacturer.

22-2.02 Joints

Joints for pipe and fittings shall be integral bell and spigot type using flexible elastomeric seals (rubber gaskets), all conforming to ASTM Designation: D 3212, "Standard Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals". Joints shall be watertight when under pressure, and shall meet the 10.8 psi (25 foot head) internal pressure test according to the requirements of said ASTM D 3212. Elastomeric seals shall conform to ASTM Designation: F 477. Elastomeric seals shall be installed by the

manufacturer and covered with a removable wrap to ensure the gasket is free from debris. Pipes furnished without removable wraps covering the gaskets may be rejected by the Engineer for use in the Work. Only joint lubricant furnished by the pipe manufacturer shall be used on the seals and bell during assembly. Reference is made to Section 6-5, "Certificates of Compliance". The Contractor shall upon request furnish the Engineer with certification that the lubricant being used was furnished by the pipe manufacturer. The ends of HDPE Plastic Pipe shall be of such design that when properly joined, they shall have a smooth and uniform interior surface across the face of the joint.

22-3 Installation

HDPE Plastic Pipe shall be installed in compliance with the applicable requirements of Section 8, "Prosecution and Progress of the Work", and in compliance with ASTM Designation: D 2321, "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications", except as modified in this Section 22-3.

22-3.01 Excavation

Excavation for installing HDPE Plastic Pipe shall comply with the requirements of Section 14-3, "Trench and Structure Excavation", and ASTM Designation: D2321, except that the following minimum trench widths shall apply:

<u>Pipe Internal Diameter</u>	<u>Minimum Trench Width</u>
Up to 18"	OD + 18"
24"	OD + 24"

OD = Outside Diameter of Pipe

These widths are to provide space to conduct appropriate backfill compaction under and around the pipe haunches. While they are "minimum", the Contractor shall make every attempt not to excavate trenches any wider than necessary. The Contractor may, with the approval of the Engineer, reduce the above trench widths by use of a slurry cement or other approved initial backfill material. Reference is made to Section 22-3.06, "Slurry Cement Haunching and Initial Backfill".

Pursuant to said Section 14-3, trenches encountering rock, hardpan, or other material in the trench bottom unsuitable for pipe bedding, as determined by the Engineer, shall be over-excavated four (4) inches and backfilled with bedding material complying with Section 22-3.02, "Bedding". Where wet, spongy, or other unstable material is encountered, trenches shall be over-excavated twelve (12) inches, or to such other depth as determined by the Engineer to remove unsuitable material, and backfilled with bedding as provided in said Section 22-3.02. The cost of over-excavating and providing bedding for trenches shall be considered as included in the price paid for HDPE Plastic Pipe, and no additional payment will be made therefor.

22-3.02 Bedding

When over-excavation of trenches is required pursuant to Section 14-3, "Trench and Structure Excavation", due to unsuitable bedding material in the trench bottom, Bedding shall be furnished for HDPE Plastic Pipe conforming to Class IA, Class IB, Class II, or Class

III as specified in ASTM Designation: D 2321, and placed in accordance with Section 15-3, "Bedding". The cost for providing bedding shall be considered as included in the price paid for HDPE Plastic Pipe, and no additional payment will be made therefor. Reference is made to Section 22-3.06, "Slurry Cement Haunching and Initial Backfill".

22-3.03 Pipe Laying

Pipes shall be laid in conformity with the prescribed lines and grades obtained from survey stakes set by the Engineer. The pipe shall be laid uphill from structure to structure with the bell end up-grade. During jointing operations, the two sections to be joined shall be firmly placed together in such a manner that the bell or groove end of the pipe fits truly and snugly over the tongue end. The tongue end shall be inserted into the bell end up to the manufacturer's index mark, if so provided on the pipe. Adjustments of pipes to line and grade shall be made under the body of the pipe throughout its entire length and not by blocking or wedging. Bell holes shall be accurately placed and shall not be larger than is reasonably required to make the joint. Before the pipe is laid, the interior of the bell of the preceding pipe shall be carefully cleaned. Reference is made to Section 22-2.02, "Joints". Lubrication shall be applied to the joint in accordance with the manufacturer's recommendations. There shall be no appreciable gap between the ends of pipes at joints, except as permitted by Section 22-4, "Curved Alignments". After jointing procedures have commenced, there shall be no movement of the pipe whatsoever in subsequent operations. Material shall be placed uniformly on either side of the pipe to prevent any movement, in accordance with Section 22-3.05, "Haunching, Initial Backfill and Compaction".

22-3.03.1 Floatation Prevention

The Contractor shall take appropriate measures to prevent floatation of the pipe during all backfill operations, including placement of backfill per Section 22-3.05, "Haunching, Initial Backfill and Compaction", and Section 22-3.06, "Slurry Cement Haunching and Initial Backfill". The entire length of the pipe shall be anchored by methods approved by the Engineer to prevent any vertical or horizontal movement of the pipe during such operations. Anchors shall cause no deflections in or damage to the pipe, and shall be removed once the pipe is sufficiently stable in position after sufficient backfill has been placed. The Contractor shall provide pipe grade control during installation and make any adjustments in pipe position to conform to lines and grades shown on the Plans before placement of final backfill. Performance of Floatation Prevention shall in no way relieve the Contractor of the responsibility to excavate and re-lay pipeline found by tests as provided in Section 22-6, "Testing", to be out of conformance with the lines and grades shown on the Plans. The cost for providing Floatation Prevention shall be included in the price bid for HDPE Plastic Pipe, and no additional payment will be made therefor.

22-3.04 Construction Joints

Whenever two sections of pipe are to be connected where standard joints are not available, such as joining HDPE Plastic pipe to RCP, a concrete collar shall be constructed around the full periphery of the pipes to be joined, extending one (1) foot beyond each side of the joint. The collar shall be of a minimum thickness equal to that of the thicker pipe, but in no case less than four (4) inches thick. The interior of the joint shall be smoothed with cement

mortar and brushed. The area to receive the collar shall be thoroughly cleaned and dampened immediately prior to construction of the collar.

22-3.05 Haunching, Initial Backfill, and Compaction

Haunching and Initial Backfill shall be placed from the top of bedding to one (1) foot above the outside top of pipe in compliance with Section 15-4.02.4, "Haunching and Initial Backfill, HDPE Plastic Pipe". Compaction shall comply with Section 15-8, "Compaction".

22-3.06 Slurry Cement Haunching and Initial Backfill

Where shown on the Plans or specified in the Special Provisions, or specifically approved for use by the Engineer, Slurry Cement Backfill to be used in lieu of haunching and initial backfill material as specified in Section 22-3.05, "Initial Backfill, Haunching, and Compaction", or as bedding material required pursuant to Section 22-3.02, "Bedding", shall conform to Section 15-2.03, "Slurry Cement Backfill".

When Slurry Cement Backfill is used for haunching and initial backfill, the width of the trench excavation as designated in Section 22-3.01, "Excavation", may be reduced so that the clear distance between the outside of the pipe and the side of the excavation on each side of the pipe, is a minimum of six (6) inches for pipes up to twenty-four (24) inches in internal diameter. Slurry Cement Haunching and Initial Backfill shall be placed from the outside bottom of the pipe to one (1) foot above the outside top of pipe and shall be consolidated by use of appropriate vibrators. When slurry cement is used as bedding and/or as initial backfill, in accordance with Section 22-3.03.1 "Floatation Prevention", the Contractor shall take measures approved by the Engineer to anchor the pipe for its full length to prevent floating. Any pipe that has floated from line or grade shall be removed and re-laid to proper line and grade. Unless otherwise specified in the Special Provisions, no additional payment will be made for Slurry Cement Bedding or Haunching and Initial Backfill.

In accordance with said Section 15-2.03, backfill may be placed over Slurry Cement Backfill no sooner than four (4) hours after placement of the Slurry Cement Backfill unless concrete sand is used for the aggregate in the slurry cement, the adjacent undisturbed material is free draining, and water is no longer standing on the slurry cement, all as determined by the Engineer.

22-3.07 Final Backfill and Compaction

Final backfill for the remainder of the trench from one (1) foot above the outside top of pipe to the surface shall be performed in accordance with Section 15-4.03, "Final Backfill, Pre-cast Pipe". Compaction shall comply with Section 15-8, "Compaction".

22-3.08 Minimum Cover

Unless otherwise shown on the Plans or specified in the Special Provisions, where it is necessary to deviate from the pipe elevations shown on the Plans, as determined by the Engineer, the pipe shall be placed such that the minimum cover over HDPE Plastic Pipe shall be three (3) feet, as measured from the lowest finish roadway elevation or ground surface elevation in non-roadway installations, except that within retention basins, minimum cover shall be four (4) feet. Reference is made to Section 22-3.06, "Slurry Cement Haunching and

Initial Backfill”. Unless otherwise shown on the Plans, specified in the Special Provisions, or approved by the Engineer, no reduction in minimum cover will be allowed when slurry cement is used for Haunching and Initial backfill.

In cases where the minimum cover over the pipe as above specified may be reduced to less than the specified amounts, the Contractor shall provide and place bedding and backfill as directed by the Engineer for the conditions encountered. The additional cost of a higher strength class of pipe or special bedding will be paid for as Extra Work in accordance with Section 4-4, “Extra Work” and Section 9-5, “Payment for Extra Work”, but only when such change is directed by the Engineer.

22-4 Curved Alignments

Pipes shown on the Plans to be laid on a curve shall be placed in strict conformance with the alignment and grade determined by marker stakes set by the Engineer. Unless otherwise shown on the Plans, curvature shall be accomplished by straight line runs of pipe connected by angle fittings prefabricated by the pipe manufacturer. Deflection at individual joints will not be permitted, except in cases where field conditions require unanticipated shifts in alignment or grade. Such shifts shall be accomplished at a curvature approved by the Engineer so that the pipe joints shall be deflected no greater than the manufacturer’s maximum recommended joint deflection. At locations where maximum recommended deflection angles must be exceeded, the Contractor shall install pre-manufactured angles as approved by Engineer. Unanticipated pre-manufactured angle fittings will be paid for at the unit price bid for fittings. If no bid item is provided therefor, unanticipated angles will be measured in length and paid for at the unit price bid per linear foot of pipe, and no additional payment will be made therefor, including any down time awaiting arrival of the required angle fittings.

22-5 Protection of Pipe

The Contractor shall exercise every precaution against damage to the pipe, including damage from subsequent backfill or compaction operations. Any damaged pipe shall be removed from the work or repaired as directed by the Engineer. The requirements of this Section 22-5 shall not relieve the Contractor of the provisions of Section 7-14, "Contractor’s Responsibility for Work and Materials”.

22-6 Testing

Where specified in the Special Provisions, or as required by the local jurisdictional agency, or when directed by the Engineer, HDPE Plastic Pipe shall be tested for deformation and leakage, and video inspected for line, grade, damage, and debris. All tests shall be performed by the Contractor using methods specified in this Section 22, “High Density Polyethylene (HDPE) Plastic Pipe”, or as specifically approved by the Engineer.

Any portion of the pipeline failing any of the tests or video inspection shall be dug up and repaired/replaced/re-laid. Failed locations shall be re-tested and re-videoed. Where testing or video inspection are not shown on the Plans or specified in the Special Provisions, they shall be at the discretion of the Engineer; any one or any combination, including all three, of the tests and video inspection may be required. All tests and video inspection shall be conducted after trenches have been backfilled and compacted, but before trench resurfacing. Tests and video

inspections, when required by the Special Provisions or the Engineer to be furnished by the Contractor, shall conform to the following:

Deformation testing shall be by mandrel or rigid ball method in accordance with Section 306-1.2.12, "Field Inspection for Plastic Pipe and Fittings", of the "Greenbook" Standard Specifications for Public Works Construction, as amended. Deformation shall not exceed five (5) percent of the internal pipe diameter. The deformation test shall be conducted at the latest time possible before trench resurfacing to allow maximum deformation to occur.

Testing for leakage shall be conducted in accordance with the following. Where shown on the Plans or specified in the Special Provisions, or where directed by the Engineer, the Contractor shall conduct a Hydrostatic Test at each location shown, specified, or directed, in accordance with the test provisions of Section 65-1.08, "Laying Siphon and Pressure Pipe", of the Caltrans Standard Specifications, except that the test shall be performed after completion of final backfill but before final surface restoration.

Unless otherwise shown on the Plans or specified in the Special Provisions, manholes at both ends of the pipe to be tested shall be included in the test. Should leakage from the combined pipe and connecting manholes exceed the allowable limit of leakage computed pursuant to said Section 65-1.08, the Contractor shall undertake measures to seal the pipes and manholes, or take such other actions as are necessary, to eliminate the leakage or reduce it to an amount less than the allowable limit, all of which must be approved by the Engineer. The combined pipe and manholes shall be re-tested in conformance with said Section 65-1.08 after such approved measures are performed.

The Contractor shall comply with the requirements of Section 7-10, "Permits, Licenses, and Fees", and Section 7-32, "Electrical and Water Service", for water to be used for the Hydrostatic Test. All costs for water and any required permits shall be included in the cost of providing the tests, and no additional payment will be made therefor.

A closed circuit television inspection shall be conducted on the interior of the newly installed pipe. If either or both of the mandrel/rigid ball and air test are required, the video inspection shall follow and not precede these tests. A DVD disc showing the initial video inspection, as well as any subsequent video inspections, shall be provided to the District at no cost.

Where deformation and/or hydrostatic tests are specified or are required by the Engineer, in lieu of these tests, the Contractor may, with the approval of the Engineer, elect to place slurry cement initial backfill conforming to Section 22-3.06, "Slurry Cement Haunching, Initial Backfill". The video inspection may still be required. No additional payment will be made for the alternative method of initial backfill.

When any test or combination of tests prescribed by this Section 22-6, "Testing", are required on the Plans or specified in the Special Provisions, the cost thereof shall be paid for as provided in the Special Provisions. If any test or combination of tests are required by the Plans or the Special Provisions and no method of payment is prescribed in either, the cost thereof shall be considered as included in the price bid for HDPE Plastic Pipe, and no additional payment will be

made therefor. When any test or combination of tests are not required by the Plans or Special Provisions, but are required by the Engineer, the cost thereof shall be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work". Tests will be paid for only once. All retests shall be performed at the expense of the Contractor, including any retests where the cost of the initial tests was included in the price of the HDPE Plastic Pipe.

When any test or combination of tests prescribed in this Section 22-6, "Testing", are required by the Plans, Special Provisions, or the Engineer, unless otherwise specified in the Special Provisions or specifically approved by the Engineer in writing, no partial or other payment will be made for HDPE Plastic Pipe until the test or tests so required have been successfully completed and accepted by the Engineer.

22-7 Measurement and Payment

The length of HDPE Plastic Pipe to be paid for will be the horizontal length measured by the Engineer exclusive of structures, except that pipe placed in sloped areas of retention basins or other substantially inclined surfaces, measurement shall be based on slope lengths, exclusive of structures. When pipes enter a structure at an angle different from a right angle and are cut to conform to the faces of the structure or of a slope, the quantity to be paid for will be measured along the center line of the pipe to the inside face of the structure, or to the face of the slope.

The price paid per lineal foot of HDPE Plastic Pipe shall include full compensation for furnishing all labor, materials, tools, and equipment, testing, video inspections, and doing all the work involved in installing the pipe in place, including but not limited to excavation and backfill, including slurry cement backfill where used, floatation prevention, and providing and conducting all required tests. Where HDPE Plastic Pipe is permitted as a substitution for RCP as specified in Section 17, "Reinforced Concrete Pipe (RCP)", and this Section 22, payment will be made at the unit price bid for RCP.

Unless otherwise specified in the Special Provisions, fittings will be measured and paid for on an "each" basis at the bid price therefor. If no bid item has been provided, the cost for fittings shall be considered as included in the lineal foot cost of pipe, and no additional payment will be made therefor, except as provided for unanticipated angle fittings in Section 22-4, "Curved Alignments".

Reference is made to Section 33, "Miscellaneous Facilities and Operations". Where a bid item is provided for said Section 33, the cost of constructing concrete collars shall be included therein. If no such bid item is provided, the cost for concrete collars shall be considered as included in the per lineal foot cost of the HDPE Pipe requiring the collar, and no additional payment will be made therefor.

22-8 Payment Retention

The placement of HDPE Plastic Pipe includes, but is not limited to, various items of work such as excavation, pipe installation, backfilling and moisture conditioning, compaction, and clean-up. Section 22-7, "Measurement and Payment", is hereby modified to provide for the retention of up to fifty (50) per cent of the in-place value of HDPE Plastic Pipe, or fifty (50) percent of the in-place value of RCP in the case of pipe substitutions as provided in Section 17, "Reinforced Concrete Pipe (RCP)", said percentage to be determined by the Engineer in an amount, in his judgment, proportionate to the quantities of these various items of Work not completed at the time of payment. Payment in full shall not be made until such time as all the Work involved in furnishing and installing HDPE Plastic Pipe, complete and in accordance with these Specifications, is approved by the Engineer. The retention provided by this Section 22-8 shall be in addition to the retention required by Section 9-7, "Progress Payments and Retentions".

SECTION 23 - MANHOLES

23-1 General

This Work shall consist of furnishing all labor, materials, tools and equipment necessary for constructing Manholes of the sizes and types and at the locations shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer. Manholes shall be constructed in accordance with the details shown on the Project Plans or the Standard Plans for the various sizes and types to be constructed.

Manholes shall consist of a poured-in-place or pre-cast concrete base section, (except as otherwise provided by the Standard Plans), a pre-cast or cast-in-place riser section, a pre-cast reinforced concrete taper section, or reinforced concrete flat slab lid, grade rings, cast iron frame and cover, or bolt-down cast iron pressure cover, or slotted grate cover, and poured-in-place concrete collars for cast iron frames, and surface restoration around cast iron frames.

23-2 Materials

Concrete and mortar shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar". Concrete for the base, cast-in-place riser sections, and the concrete collar for the cast iron frame shall be Class "A", or alternative mix design approved by the Engineer.

Pre-cast riser sections, tapered cones or flat slab lids, and grade rings shall be reinforced concrete and shall conform to ASTM Designation: C478, using Type II cement.

Metal frames and covers shall be cast iron meeting the requirements of ASTM Designation: A48, Class 25. Frames and covers shall be manufactured in accordance with the Standard Plans.

Steps, where required, shall be three-fourths ($\frac{3}{4}$) inch diameter steel bars conforming to ASTM Designation A108-07, galvanized after hot bending per ASTM Designation A123/A123M-09, as shown on the Standard Plans.

23-3 Excavation

Excavation for Manholes shall conform to Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading".

23-4 Forms

Forms shall conform to the requirements of Section 12-5, "Forms".

23-5 Construction

Manholes shall be constructed in accordance with the applicable Standard Plans and as herein specified.

The riser portion of the manhole, whether cast-in-place or pre-cast riser sections are used, shall be constructed such that the distance from the finish grade of the manhole cover to the top of the tapered reducing cone, or to the top of the flat slab lid, shall not exceed two (2) feet.

All entering and leaving pipes shall be placed flush with the inside edge of the Manhole, except that all pipe edges shall be rounded and smoothed with cement mortar to a three (3) inch radius as shown on the Standard Plans. Any gap between the wall and the pipe after insertion shall be completely filled with mortar to provide a water-tight joint.

The top of the base section shall be keyed to receive the tongue end of the riser section. The key shall be formed in the freshly poured concrete by using a template manufactured to the dimensions of the riser section or by a method approved by Engineer. If the riser is cast-in-place monolithically with the base section by using a slip form or other means, the key may be omitted between the base and riser. If the base and riser sections are not poured monolithically but separately, a key shall be provided in the base section. In either case, a key will be required in the top of the riser section to receive the tongue end of the tapered cone or flat slab. Cast-in-place riser sections shall have the minimum wall thickness shown on the Standard Plans.

Where low-pressure manholes are shown on the Plans, the reinforcing steel used to anchor the various manhole segments and components together as shown on the Standard Plans shall have a minimum cover of two (2) inches of cement mortar or concrete conforming to Section 12, "Portland Cement Concrete; Cement Mortar".

Where use of a flat slab lid is shown on the Plans or specified in the Special Provisions, or field conditions require the use as determined by the Engineer, the lid that is furnished and installed shall be designed for HS20-44 loading.

The joints between the base and all pre-cast elements of the manhole, including adjustment rings and manhole frame, shall be filled with cement mortar, mastic band seal, or approved equal prior to joining the elements.

The interior of the manhole shall be troweled smooth with a wooden trowel, removing excess mortar extruded out of joints for the entire height of the manhole, from the manhole frame to the floor. All excess mortar and any other debris shall be removed from the manhole.

Where steps are required, they shall be installed in accordance with the Standard Plans therefor, and shall comply with Section 3277 of Article 4, Group 1 of Subchapter 7, General Industry Safety Orders, of Title 8 of the California Code of Regulations.

23-6 Backfill and Compaction

Backfill and Compaction shall conform to the requirements of Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction".

23-7 Curing

Exposed concrete surfaces shall be cured in accordance with Section 12-6, "Curing Concrete".

23-8 Raising to Grade

Manholes constructed in finished roadway areas, or other finished areas, shall be brought to the same elevation as the surrounding finished surface as shown on the Project Plans or in accordance with the Standard Plans. Manholes constructed in unfinished areas shall be brought to the elevation shown on the Plans, specified in the Special Provisions, or as determined by the Engineer.

In all cases where manhole covers are to be brought to finish grade, the method of pavement repair shall be as shown on the Plans or specified in the Special Provisions, or as specified by the jurisdictional agency issuing the permit for the work. In the absence of the forgoing, the repair shall be made in accordance with the applicable Standard Plans.

Where trenches are to receive surface restoration by the Contractor as provided in Section 16, "Restoration of Surfaces", or the trench is located in a street or other area to be reconstructed or newly constructed by others, or at such other locations shown on the Plans, specified in the Special Provisions, or directed by the Engineer, Manholes shall be left a minimum of one (1) foot and a maximum of eighteen (18) inches below final finish grade of trench resurfacing or streets or other areas. The manhole frame and cover shall be temporarily set as specified by the Engineer.

Unless otherwise specified in the Special Provisions, the Contractor shall be required to return to raise manholes to finish grade after completing surface restoration or following the construction or reconstruction of the street or other area by others. The cost for raising manholes to grade, including returning after surface restoration, or construction or reconstruction of streets or other areas by others, shall be included in the price bid per manhole, and no additional payment will be made unless a bid item is provided therefor.

23-9 Payment

The unit price paid for Manholes shall include full compensation for furnishing all labor, materials, tools and equipment and doing all the work involved in constructing or installing the Manhole in place complete including, but not limited to, all structural elements as shown on the Project Plans or Standard Plans, including frame and cover, excavation and backfill, connecting existing or new lateral or main pipelines, furnishing frame and cover, pressure, bolt-down or slotted cover where required, raising to finish grade, concrete collars, and surface restoration.

SECTION 24 - STORM DRAIN INLETS AND OUTLETS**24-1 General**

This Work shall consist of providing all labor, materials, tools and equipment necessary to construct Storm Drain Inlets and Outlets of the types and locations shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer. Storm Drain Inlets and Outlets shall be constructed in accordance with the details shown on the Project Plans or the applicable Standard Plans.

24-2 Materials

Concrete and mortar shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar". Concrete shall be Class "A", or an alternate mix design approved by the Engineer.

All metal parts shall be structural grade steel, except those permitted to be cast iron by the project Plans or Standard Plans; bar reinforcement shall conform to the requirements of Section 11, "Reinforcement". Unless otherwise specified in the Special Provisions, a coating of an approved asphaltum black paint, or such other coating as may be approved by the Engineer, shall be applied by dipping or painting to all frames, grates, grate covers, access covers, and all other exposed metal parts. Prior to coating, the surfaces of all metal parts shall be prepared in accordance with Section 32, "Painting".

24-3 Forms

Forms shall conform to the requirements of Section 12-5, "Forms". The Contractor shall not place concrete in any forms until the forms have been approved for line and grade by the Engineer.

24-4 Excavation

Excavation shall conform to the requirements of Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading".

24-5 Construction

Storm Drain Inlets or Outlets may be constructed either by completely forming the interior and exterior of the structure, or by forming only the interior and upper section and neat pouring concrete for the lower section against undisturbed earth that has been excavated to the lines and grades indicated on the Plans or as directed by the Engineer.

Storm Drain Inlets and Outlets eight (8) feet or less in depth shall be constructed monolithically (one pour), or if the Contractor elects, the structures may be constructed in two sections (two pour) as detailed on the Standard Plans, provided the second pour follows the first pour no later than forty-eight (48) hours. No additional payment will be made for two-pour construction.

The surface finish of the exterior exposed surfaces of concrete shall conform to the adjacent sidewalk or curb and gutter finish required by the jurisdictional agency issuing the permit for the work, and as required by Section 27-7, "Construction of Curbs and Gutters". The interior surface shall have a wood trowel finish. Excessive voids shall be chipped and repaired as directed by the Engineer.

Depths of Storm Drain Inlets or Outlets may vary according to the depth and grade at which the lateral pipe must be installed in order to avoid existing utilities. The contractor shall allow in his bid price for the various inlet or outlet structures full compensation for any possible increase or decrease in the anticipated depth because of adjustment in depth of lateral pipes.

Lateral pipes connecting to Storm Drain Inlets and Outlets shall be installed flush with the inside walls of the structure, except that pipe edges shall be smoothed and rounded with cement mortar to a three (3) inch radius as specified on the Standard Plans for the type of inlet or outlet installed. Pipe connections shall be entirely sealed with cement mortar. Cement mortar used for pipe edge rounding and connection sealing shall conform to Section 12, "Portland Cement Concrete; Cement Mortar".

Existing concrete work or other improvements shall be removed and replaced as necessary to install proposed inlets and outlets. A concrete pavement saw shall be used, unless determined to be impractical by the Engineer, or unless some other method is approved by the Engineer, such as removal of concrete to an adjacent expansion joint. A minimum of one and one-half (1½) inch deep saw cut depth shall be required. Full compensation for sawcutting as necessary and removal and replacement of existing improvements shall be included in the price bid for Miscellaneous Facilities and Operations unless a more specific bid item is provided therefor. If no bid item is provided for Miscellaneous Facilities and Operations, or if no specific bid item is provided, the cost for sawcutting and removal and replacement of existing improvements shall be included in the prices bid for the various bid items of Work, and no additional payment will be made therefor.

At locations where Inlets or Outlets are constructed behind curb lines and within landscaped areas, all structure patching, final backfilling, final sprinkler system repairing, lawn reseeding, replacement of other landscaping damaged or removed by the Work, and mulching behind the curb line shall be completed within ten (10) calendar days of placing the structure. Full compensation therefor shall be included in the price bid for Miscellaneous Facilities and Operations. If no bid item is provided for Miscellaneous Facilities and Operations, the cost shall be included in the prices bid for the various bid items of Work, and no additional payment will be made therefor.

Grading work in the immediate vicinity of the installed Inlet or Outlet structures shall be done by the Contractor as directed by the Engineer so as to provide for the movement of surface water to or from the newly installed structures. Full compensation for said grading work shall be included in the price bid for Inlets or Outlets, and no additional payment will be made therefor.

24-6 Backfill and Compaction

Backfill and Compaction for Storm Drain Inlets and Outlets shall conform to the requirements of Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction", and as specified herein. Where it is necessary to construct the curb and gutter portions of Storm Drain Inlets and Outlets on disturbed earth, a foundation shall be prepared by thoroughly compacting the disturbed material to the satisfaction of the Engineer.

24-7 Protection of Inlets or Outlets

The Contractor shall exercise every precaution against damage to Storm Drain Inlets or Outlets, including damage from subsequent backfill or compaction operations. Any damaged Inlet or Outlet shall be removed from the Work or repaired as directed by the Engineer. Any painted surfaces damaged during construction, backfilling, or compaction shall be repainted in accordance with Section 24-2, "Materials". The requirements of this Section 24-7 shall not relieve the Contractor of the provisions of Section 7-14, "Contractor's Responsibility for Work and Materials."

24-8 Curing

Exposed concrete surfaces shall be cured in accordance with Section 12-6, "Curing Concrete".

24-9 Payment

The unit price paid for Storm Drain Inlets and Outlets shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in constructing the structures in place, including but not limited to excavation, forming, backfill, connecting existing or new lateral pipes, grouting, and grading where necessary.

SECTION 25 - OUTFALL STRUCTURES

25-1 General

This Work shall consist of constructing, furnishing and installing Outfall Structures of the types and sizes and at the locations shown on the Plans, as specified in the Special Provisions and these Specifications, or as directed by the Engineer. Outfall Structures shall be constructed in accordance with the details shown on the Project Plans or the applicable Standard Plans.

25-2 Materials

Concrete and cement mortar shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar". Concrete shall be Class "A", or an alternate mix design approved by the Engineer.

Bar reinforcement shall conform to the requirements of Section 11, "Reinforcement". All metal parts, including trash rack grates, frames, and guide rails, shall be of structural grade steel, except those parts that may be cast iron as provided by the details in the Project Plans or Standard Plans.

All ferrous materials for all outfalls, including but not limited to, grates, grate frames, trash racks, trash rack guide rails and appurtenances, fence cage posts and cage frames, shall be new and galvanized by the hot-dip method with the large pieces meeting the requirements as set forth in ASTM Designation: A123, and nuts, bolts and small pieces meeting the requirements as set forth in ASTM Designation: A153.

Fence fabric for outfall cages shall be nine (9) gauge steel, two (2) inch mesh, and conforming to ASTM Designation A392, Class 1 zinc coating. All edges of the fabric wire shall be bent back to form a closed loop (knuckled).

Where Vinyl Coated fence fabric is shown on the Plans or specified in the Special Provisions to be installed on outfall cages, the fabric core shall be galvanized nine (9) gauge steel, two (2) inch mesh, conforming to ASTM Designation A392, Class 1 zinc coating. The vinyl coating shall be black in color, and shall conform to ASTM Designation F668-07, Class 2(b) polymer coating, fused and adhered to the zinc coated fabric. The coated fabric wire shall have an eight (8) gauge minimum finish. All edges of the fabric shall have the wire ends bent back to form a closed loop (knuckled).

All pre-cast risers for outfall structures shall be Class II reinforced concrete pipe conforming to ASTM Designation: C 76 or ASTM Designation: C 478. Cast-in-place risers may be used for all outfall structures up to one hundred twenty six (126) inches in diameter. The minimum wall thickness for cast-in-place risers shall be eight (8) inches unless otherwise noted on the Project Plans or Standard Plans.

25-3 Excavation

Excavation shall conform to the requirements of Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading".

25-4 Forms

Forms for placing concrete shall conform to the requirement of Section 12-5, "Forms". The Contractor shall not place concrete in the forms until the forms have been approved for line and grade by the Engineer.

25-5 Construction

Outfall Structures shall be constructed in accordance with the applicable portions of Section 23, "Manholes", and Section 24, "Storm Drain Inlets and Outlets", and in accordance with the details shown on the Project Plans or Standard Plans, or as directed by the Engineer.

The surface finish of the concrete slab shall be a medium broom finish as required by the Engineer. The interior surface of the concrete shall have a wood trowel finish.

Reference is made to the Outfall Structures Design Tables in the Standard Plans. For certain types of Outfall Structures, circular riser sections may be used in place of the square risers. Should the Contractor elect to make use the circular riser, in some instances, the outfall cage intermediate post support footings may conflict with the wall of the circular vertical riser. In this case, the outfall cage structure and underlying concrete slab shall be enlarged a sufficient amount such that the post footing spacing can be increased to eliminate the conflict. Such enlargement shall be approved by the Engineer, and shall be performed by the Contractor at no additional cost to the District.

The cost of connecting storm drain laterals or pipelines to outfall structures shall be included in the prices bid for the various items of work requiring the connections and no additional compensation will be paid therefor.

25-6 Curing

Curing of exposed concrete surfaces shall comply with the requirements of Section 12-6, "Curing Concrete".

25-7 Backfill and Compaction

Backfill and Compaction for Outfall Structures shall conform to the requirements of Section 15-5, "Structure Backfill", and these Specifications. Unless otherwise shown on the Plans or specified in the Special Provisions, backfill for Outfall Structures shall have a relative compaction of not less than eighty-five (85) percent from the bottom of the excavation to within two (2) feet of the surface finish grade. The remaining top two (2) feet shall have a relative compaction of not less than ninety (90) percent. If a temporary or permanent outfall structure is located within a public right-of-way, the foregoing compaction requirements shall be increased to not less than ninety (90) percent relative compaction from the bottom of the excavation to within two (2) feet of the surface finish grade. The remaining top two (2) feet shall have a relative compaction of ninety-five (95) percent.

25-8 Fenced Outfall Cages

Where the size of the outfall structure requires installation of a fenced outfall cage, or where such cages are shown on the Plans or specified in the Special Provisions to be provided, fenced

outfall cages shall be constructed, furnished and installed in accordance with the applicable Standard Plans or as otherwise shown on the Plans or specified in the Special Provisions.

25-9 Modified Fence/Pipe Outfall Cages

Where shown on the Plans or specified in the Special Provisions to be constructed, Modified Fence/Pipe Outfall Cages shall be constructed, furnished, and installed in accordance with the applicable Standard Plans, in conformance with Section 25-2, "Materials", or as otherwise shown on the Plans or specified in the Special Provisions. The number of sides of the cage to be modified with pipe in lieu of fence fabric shall be as shown on the Plans or specified in the Special Provisions.

25-10 Trash Racks

Where shown on the Plans or specified in the Special Provisions, Trash Racks, including guide rails and all appurtenances shall be galvanized and are to be constructed and installed in accordance with the details shown on the Plans and the applicable Standard Plan. Lifting chains shall be five-sixteenths (5/16) inch diameter steel links, and attached per the details shown on the Project Plans or Standard Plan therefor.

25-11 Damage To Galvanized Materials

Any seriously damaged or abraded galvanized surfaces shall not be used in the work. Damaged or abraded galvanized surfaces not deemed serious by the Engineer shall be repaired by thoroughly wire brushing the damaged areas and removing loose and cracked coating, after which the cleaned areas shall be painted with two (2) applications of zinc oxide, zinc dust paint conforming to the requirements of Federal Specification MIL-P-15145. The paint shall be properly compounded in a suitable vehicle in the ratio of one (1) part zinc oxide to four (4) parts zinc dust, by weight.

25-12 Measurement and Payment

The unit price paid for Outfall Structures shall include full compensation for furnishing all labor, materials, tools and equipment and doing all the work involved in constructing or installing the Outfall Structure in place and complete including, but not limited to, clearing and grubbing, excavation, backfill, connecting new or existing pipelines, furnishing frames and grates, providing and installing fenced or modified fence/pipe outfall cages complete, all with no additional payment to be made therefor.

If the new Outfall Structure is to be provided with one or more Trash Racks, unless otherwise specified in the Special Provisions, the cost thereof shall be included in the price bid for the Outfall Structure, including the rack, metal guides, lifting chain, and any mounting appurtenances, and no additional payment will be made unless a specific bid item is provided therefor.

If the Trash Rack is to be installed in an existing Outfall Structure, payment thereof, including the rack, metal guides, lifting chain, and any mounting appurtenances, shall be made at the unit price bid per each, which shall include any modifications to and cleaning of the Outfall Structure and pipe to which the Trash Rack is being installed, any necessary pumping of storm or non-storm drainage water when encountered, all as necessary to provide for Trash Rack installation.

If no separate bid item is provided for Trash Rack installation in existing Outfall Structures, unless otherwise specified in the Special Provisions, the cost thereof shall be included in the price bid for Miscellaneous Facilities and Operations. In the absence of a bid item for Miscellaneous Facilities and Operations, the cost for constructing and installing Trash Racks in existing outfalls, complete as shown on the Project Plans or Standard Plans shall be included in the various Contract items of Work, and no additional payment will be made therefor.

SECTION 26 - PUMP FACILITIES

26-1 General

This Work shall consist of furnishing all labor, materials, tools and equipment, incidentals, and all other accessories necessary for a complete working system including, but not limited to, the pump, motor, sump, stilling well, control structure and discharge structure with metal grates and covers, gates and valves, trash racks, upper concrete slab with metal floor grating, ladders, steps, perimeter fencing, and furnishing and installing all required electrical power supply and automatic control equipment, liquid level sensor, communications and telemetry equipment, and site lighting. Where shown on the Plans or specified in the Special Provisions, Pump Facilities may also include construction of a pump intake structure and pump discharge outlet structure with valving, gates, and grates, and installation of connecting pipelines thereto.

Pump facilities shall be constructed in accordance with the details shown on the Plans, as specified in the Special Provisions, and as specified in this Section 26, except that specifications for all electrical, communications, and telemetry equipment and components are provided in the Special Provisions. The Contractor shall be responsible for the compatibility and adjustment of all Pump Facility components as necessary for the successful operation of the completed Pump Facilities as specified. Any incidental material or equipment not shown on the Plans nor mentioned in Special Provisions or these Specifications which may be necessary for completion and successful operation of the Pumping Facilities as specified, shall be furnished and installed as though shown or provided for.

Reference is made to Section 7-10, "Permits, Licenses, and Fees". An electrical permit from the jurisdictional agency will be required to be obtained by the Contractor at its expense. The PG&E Rule 16 will be provided by the District at its expense. Any conditions associated with the Rule 16 or discharge permit will be provided in the Special Provisions and must be carried out by the Contractor at its expense. Reference is also made to Section 26-3.03, "Excavation" for other permit and State Government Codes compliance requirements.

26-2 Vertical Mixed Flow or Axial Flow Impeller Type Pump

The pump shall be Vertical Mixed Flow or Axial Flow Impeller type, capable of producing the required flow at the operating heads shown on the Plans or specified in the Special Provisions. The pump shall also conform to the following requirements.

26-2.01 Description

The pump shall be of the oil lubricated, vertical mixed flow or axial flow impeller type. The pump shall be constructed so as to be suspended from the base plate, and the pumping element suspended below the necessary length of discharge column. The complete unit shall operate free from excessive vibration and noise, and shall operate over the specified range without cavitating.

26-2.02 Bowl Assembly

The bowl assembly shall consist of a suction bell, intermediate bowl or bowls, discharge case, impellers, pump shaft, pump shaft bearings, and necessary parts to secure the impellers to the shaft.

The bowl assembly shall be constructed with adequate bearings above and below the impeller. The bowls shall be cast with smooth interior and exterior surfaces. The suction bell and discharge case shall be single self-supporting units provided with heavy flanges accurately faced, registered, and drilled for connection to the intermediate bowls and the discharge column.

The suction bell shall be designed to permit proper distribution of the liquid to the impeller and shall have a bell-shaped entrance to reduce entrance losses.

All bowls must be so designed that they will withstand not less than twice the shut-off pressure of the pump when operating at the specified speed. In no case shall the wall thickness of the bowls be less than that of the column.

26-2.03 Impeller and Shaft

The impeller shall be free from any kind of imperfection, cast in one piece and finished all over to a smooth surface, correct in shape and contour, statically balanced. Means shall be provided for locking the impeller to the pump shaft in such a manner as to prevent damage should the direction of rotation become reversed from any cause.

The pump shaft shall be considered that section of shafting which supports the impeller in the bowl assembly and extends to a point immediately above the discharge case bearing and connects to the lineshafting. The pump shaft shall be grade 416 stainless steel, turned, ground and polished precision shafting. The shaft dimensions shall be such that no excessive deflection or whip will occur.

The keys and thrust collars or other pertinent parts used to support the thrust and transmit the torque to the impeller shall be made of a corrosion resistant metal.

26-2.04 Discharge Column Assembly

The discharge column assembly shall consist of the elbow, necessary sections of column, shaft enclosing tube, lineshafting, lineshaft couplings, combination lineshaft bearings and enclosing tube couplings, and enclosing tube tension device.

The column shall be designed for suspension from the baseplate and shall be constructed of flanged joint sections not exceeding ten (10) feet in length each. Flange bolts shall be stainless steel. The column and elbow shall be so proportioned as to safely support the bowl assembly and withstand the hydraulic pressure and thrust and any other load that it may be subjected to during transportation, erection or operation. Columns shall be fitted at each joint with a welded tube-stabilizer with rubber grommet inserts.

The discharge elbow shall be of the type and at the location as shown on the Plans and as specified in the Special Provisions.

If more than one section of the column is used to connect the bowl assembly to the discharge elbow, the diameter of any intermediate section shall be the same as the diameter of the discharge end of the elbow. The lowest section of column or the lower end of the elbow (if it is connected directly to the discharge case) may be tapered to make proper connection to the discharge case.

The elbow and each of the column pipes shall be provided with lifting lugs or lifting eyes to facilitate the handling of these parts during installation.

The elbow and column are to be fabricated of structural steel of a thickness not less than that specified below.

O.D. Col. Size (Inches)	Minimum Wall Thickness* (Inches)	O.D. Col. Size (Inches)	Minimum Wall Thickness* (Inches)
10 ³ / ₄	0.250	30	0.375
12 ³ / ₄	0.250	36	0.375
14	0.365	42	0.375
16	0.365	48	0.375
18	0.365	54	0.375
20	0.365	60	0.375
24	0.375		

* Thicknesses shown are minimums only. The Contractor shall furnish the thickness specified in the Special Provisions.

The interior and exterior of the entire length of column and discharge elbow shall be protected with a coat of Amerlock 400 self-priming epoxy or approved equal. The protection shall be applied in conformance with the manufacturer's recommendations.

26-2.05 Lineshafts

The shaft enclosing tubes shall be designed to support the lineshaft bearings and prevent leakage of the fluid being pumped into the lineshaft assembly. The tube may be threaded internally to receive a combination tube coupling and lineshaft bearing. Means shall be provided at the base plate for tension loading of the enclosing tube. If special wrenches or tools are required to perform this operation, they shall be provided by the Contractor. Reference is made to Section 26-2.07, "Wrenches and Special Tools".

All lineshaft bearings shall be of the removable type so that they can be readily replaced in the field. They must be provided with means of passing the oil from one bearing to the next in the lineshaft assembly to ensure adequate lubrication to each lineshaft bearing. The bearing spacing is to be such that no vibration will occur; bearing spacing of more than five (5) feet will not be permitted.

Pumps shall be equipped with a solenoid operated lubricating system which shall supply lubricant to the lineshaft bearings. The oiler shall be designed for outdoor operation and provided with a metal oil reservoir of not less than one (1) gallon capacity. The metal oil reservoir cover shall be provided with a locking device approved by the Engineer.

The shaft shall be turned, ground and polished precision shafting. The shaft dimension is to be such that no excessive deflection or whip will occur.

Lineshaft couplings shall be designed to transmit the full load torque required to operate the pump. They shall be designed also to maintain alignment between adjacent sections of shafting and shall be interchangeable so that matchmaking is not necessary on installation.

26-2.06 Motor Base Assembly

The motor base assembly shall consist of a baseplate assembly, lubricator bracket, shaft enclosing tube tension nut, and floor plates.

Motor baseplates must be sturdily built and designed for resting on a concrete foundation or steel supporting beams. The dimensions of the baseplate shall be of sufficient width and length to provide a minimum of four (4) inches projection on the supporting structure on all sides. The size of the opening in the floor shall be sufficient to permit removal of all pump parts which are installed below the base. The baseplate shall be accurately machined to fit the motor register so that when fully assembled the motor, pump, and lineshafts will be concentric and all rotating parts shall run freely without binding.

The motor baseplate and elbow assembly shall be so constructed that all parts requiring maintenance adjustments are easily accessible. The motor pedestal above the baseplate shall be made of material not less in thickness than the material used in the column pipe and shall be designed to exclude vibration. The pedestal shall be fabricated as a part of the baseplate or shall be accurately machined to make a registered fit with the baseplate.

The shaft enclosing tube tension nut assembly shall be so designed that it will hold the oil tube in proper alignment and tension, and provision shall be made to prevent drainage and dirt from entering the oil tube.

Lifting lugs or eye bolts shall be provided to facilitate the handling of the baseplate during installation.

When completely assembled, the motor pedestal, baseplate and supporting beams shall be of sufficient strength to ensure vibration-free operation.

26-2.07 Wrenches and Special Tools

The Contractor shall furnish a complete set of special tools as required for the operation, maintenance, assembly, and dismantling of the pump. Standard commercial tools such as end wrenches, pipe wrenches, slings, etc. will not be required to be furnished.

26-2.08 Pump Motor

The pump motor shall be the unit drive construction. The thrust bearing shall have ample capacity to carry the weight of all the rotating parts plus the hydraulic thrust of the impellers and have an ample safety factor. This factor should be based on an average life expectancy of five (5) years operation at twenty-four (24) hours per day. The motor shall be full voltage starting, vertical hollow shaft, squirrel cage induction type and shall conform to the standards of the National Electrical Manufacturers Association (N.E.M.A.). The motor speed shall be as specified on the Plans, and shall be of the proper size and power to drive the pump continuously under the actual operating head with a temperature rise of not more than sixty (60) degrees C above the ambient temperature.

26-2.09 Assembly Drawings and Installation Instructions

The Contractor shall provide three (3) sets of installation and operating instructions and assembly drawings assembled in book form so that adequate instructions are available to cover the pump.

26-3 Pump Sump

The pump sump shall be constructed in accordance with the details shown on the Plans, and shall conform to the following provisions.

26-3.01 Materials

Concrete used to construct the sump base shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar", and shall be Class A.

Sump riser sections shall be Rubber Gasket Reinforced Concrete Pipe with flush bell joints and conforming to ASTM Designation C-76, and shall be of the size and strength class specified on the Plans or specified in the Special Provisions.

All metal parts shall be of a structural grade steel and galvanized.

Bar reinforcement shall conform to the requirements of Section 11, "Reinforcement".

26-3.02 Forms

Forms shall conform to the requirements of Section 12-5, "Forms". Forms shall be smooth, mortar tight, true to the required lines and grade, and of sufficient strength to resist springing out of shape during the placing of the concrete. All dirt, chips, sawdust, nails, and other foreign matter shall be completely removed from forms before any concrete is deposited therein. Forms previously used shall be thoroughly cleaned of all dirt, mortar and foreign matter before being reused. Before concrete is placed in forms, all inside surfaces of the forms shall be thoroughly coated with form oil.

26-3.03 Excavation

Excavation for sump installations shall conform to the requirements of Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading". The Contractor shall also comply with the provisions of the Construction Safety Orders and the Tunnel Safety Orders of the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal OSHA). An excavation Permit will be required from Cal OSHA in accordance with Section 7-18, "Worker Protection from Caving Ground in Excavations".

Further, for excavations greater than twenty (20) feet in depth, in accordance with Article 6, Subchapter 4, Chapter 4 (Construction Safety Orders), Division 1, Title 8, of the California Code of Regulations, detailed excavation plans shall be prepared and signed by a Registered Civil or Structural Engineer showing all sloping, shoring, bracing, or other protective measures to be provided for worker protection. Such plans shall be submitted to the Engineer for review and approval prior to beginning any excavation.

The Contractor shall also comply with, Section 7-19, "Worker Protection From Toxic or Explosive Gases; Confined Spaces Entry", Section 7-20, "Trenches and Excavations-Hazardous Waste", and Section 7-21, "Protection of Archeological, Cultural, Paleontological Resources".

26-3.04 Placing Concrete

All concrete for the sump base shall be used while fresh and before it has taken an initial set. Re-tempering any partially hardened concrete with additional water will not be permitted. All concrete shall be compacted by means of high frequency internal vibrators. Mixed concrete, after being deposited, shall be consolidated until all voids are filled and free mortar appears on the surface. Concrete surfaces on the interior of the sump shall be given a wood trowel finish.

26-3.05 Backfill and Compaction

Sump backfill shall be furnished and placed in conformance with the requirements of Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction" except as modified herein. Backfilling around the sump shall be with earth free from lumps, hardpan chunks, paving material, organic matter or other deleterious substances. In accordance with Section 15-8, "Compaction", backfill around the sump shall, for the full depth as measured from the bottom of the excavation to the surface finish elevations shown on the Plans, and for the full horizontal width of the excavation, have a relative compaction of not less than ninety-five (95) percent as determined by the Caltrans California Test Method 216, Test Method 231, or ASTM D1557 as appropriate for this application.

26-3.06 Sump Ladder

Sump Ladders shall conform to the Standard Plan for Pump Sump/Control Structure Ladder. Sump Ladders shall be constructed of galvanized steel, and all attachment brackets, bolts, and any other ladder components shall be galvanized. Ladders shall be anchored at the access opening and the sump base as shown on the Project Plans and the Standard Plan, and attached to the sump wall in a manner and at intervals not to exceed five (5) feet, or such lesser amount, as may be shown on the Plans, specified in the Special Provisions, or

designated in the manufacturer's recommendations, whichever is more restrictive. Ladder segments shall be furnished in lengths of not less than ten (10) feet, and connected to each other in accordance with the manufacturer's recommendations. Rungs shall be sixteen (16) inches horizontal clear length between side rails, slip resistant, and spaced with twelve (12) inches vertical distance between the tops of successive rungs. Ladders shall comply with the requirements of Section 3277 of Article 4, Group 1 of Subchapter 7, General Industry Safety Orders, of Title 8 of the California Code of Regulations.

26-4 Concrete Slab

The concrete slab for the Pump Facilities shall be constructed to the dimensions shown on the Plans, and as specified in Section 27, "Curbs, Gutters, Valley Gutters, Sidewalk and Mowstrips". Concrete reinforcement shall be provided as shown on the Plans or specified in the Special Provisions.

26-5 Floor Grating

Floor gratings to be incorporated into the concrete slab shall be the standard product of an established grating manufacturer conforming to the dimensions and details shown on the Plans. Gratings and access ports shall be constructed of structural steel, galvanized, slip resistant, and Americans with Disabilities Act (ADA) compliant. Grate supports shall be structural steel and galvanized. Floor gratings shall be furnished with no exposed ends. Where it is necessary to cut a pre-manufactured grate to fit the dimensions of the floor opening shown on the Plans, a metal strap of the same size and quality of the grate shall be welded over the exposed ends of the grating such that the complete periphery of the grating panel is enclosed. The panel shall be hot-dipped galvanized after welding straps.

26-6 Control Structure

The Pump Control Structure shall consist of a poured-in-place reinforced concrete base and reinforced concrete riser sections, and constructed as shown on the Plans. Concrete shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar", and reinforcement shall conform to the requirements of Section 11, "Reinforcement". Riser sections shall be Rubber Gasket Reinforced Concrete Pipe with flush bell joints and conforming to ASTM Designation C-76, of the size and strength class shown on the Plans. The structure shall contain valves and gates as shown on the Plans, and a metal grate cover conforming to Section 26-5, "Floor Grating", or as otherwise shown on the Plans or specified in the Special Provisions.

The Control Structure shall be fitted with a ladder conforming to Section 26-3.06, "Sump Ladder".

26-7 Discharge Structure

The Pump Discharge Structure shall consist of a poured-in-place reinforced concrete base, reinforced concrete riser sections, and a riser cover. The Discharge Structure shall be constructed as shown on the Plans and the Standard Plan for the riser cover. Concrete shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar", and reinforcement shall conform to the requirements of Section 11, "Reinforcement". Riser sections shall be Rubber Gasket Reinforced Concrete Pipe conforming to ASTM Designation C-76, with flush bell joints and of the size and strength class shown on the Plans; or, Reinforced Concrete

Pipe conforming to ASTM C 478 manufactured with rubber gasket joints. The structure shall contain valves, gates and an expanded metal riser cover, all conforming to the details shown on the Project Plans, the applicable Standard Plans, or specified in the Special Provisions.

The upper riser section shall be fitted with a riser cover which shall be constructed in accordance with the Standard Plan therefor unless otherwise shown on the Project Plans or specified in the Special Provisions. The riser cover shall consist of ¾" x #9, Type "R" (Regular) galvanized raised expanded carbon steel metal conforming to ASTM A 1011, and welded to a ⅛" x 2" galvanized steel band of sufficient diameter to fit over the riser to permit easy removal but without unnecessary lateral movement. Welded areas shall be re-galvanized or may be cleaned and painted with two (2) coats of zinc oxide, zinc dust paint conforming to the requirements of Federal specification MIL-P-15145, the paint to be properly compounded in a suitable vehicle in the ratio of one (1) part zinc oxide to four (4) parts zinc dust, by weight. The riser cover shall be provided with a lockable security hasp and mounting straps to secure the cover to the riser as shown on the Standard Plan.

Discharge Structures shall be fitted with steps conforming to Section 23-2, "Materials", and the applicable Standard Plan for Manholes With Steps.

26-8 Reinforced Concrete Pipe

Pipe installed to inter-connect the various pump station components, including the intake structure, sump, control structure, discharge structure, and discharge outlet structure, shall be Rubber Gasket Reinforced Concrete Pipe manufactured in accordance with ASTM Designation: C76, and shall be furnished in the class and size as shown on the Plans. The pipe shall be installed as specified in Section 17, "Reinforced Concrete Pipe (RCP)".

26-9 Trash Rack

Where shown on the Plans to be installed, Trash Racks shall be constructed and installed in accordance with Section 25-10, "Trash Racks", and with the details shown on the Project Plans and Standard Plan therefor. Any damage to galvanizing caused by delivery, installation, or any other cause, shall be repaired in accordance with said Section 25-10.

26-10 Fence Enclosure

The fence and related gates enclosing the Pump Facilities shall be six (6) foot Chain Link, furnished and installed in conformance with Section 28, "Chain Link Fence and Gates". The fence and gates shall be fitted with vertical post extensions and three (3) strands of barbed wire conforming to Section 28-2.06, "Barbed Wire", for the entire periphery of the Pump Facility.

26-11 Security Lights

Security lights shall be furnished and installed in conformance with the details shown on the Plans and as specified in the Special Provisions.

26-12 Measurement and Payment:

Pump Facilities shall be measured on a lump sum basis. The lump sum price paid for Pump Facilities shall include full compensation for furnishing and installing the pump, motor, sump, control structure, discharge structure, gates and valves, stilling wells, ladders and steps, trash racks when shown on the Plans or specified in the Special Provisions, concrete slab, electrical power and control equipment, communications and telemetry equipment, fence enclosure, and security lights, and all other accessories necessary for a complete working system. The lump sum price paid shall further include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the Pump Facilities complete in place.

SECTION 27 - CURBS, GUTTERS, VALLEY GUTTERS, SIDEWALKS AND MOWSTRIPS**27-1 General**

This Work shall consist of furnishing all labor, materials, tools and equipment for the construction of concrete curbs, gutters, valley gutters, sidewalks, and mowstrips as indicated on the Plans to the appropriate standards of the agency having jurisdiction for issuing the permit for performing such work, and as a minimum be as specified in the Special Provisions and these Specifications.

27-2 Materials

Concrete and mortar shall conform to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar". Concrete shall be Class "A" or Class "B".

Bar reinforcement shall conform to the requirements of Section 11, "Reinforcement".

Premolded expansion joint filler shall conform to the specifications of ASTM Designation: D1751 and Section 27-6, "Expansion Joints".

27-3 Subgrade Preparation

Subgrade for the concrete improvements shall be constructed and prepared true to grade and cross section, as shown on the Plans or as directed by the Engineer. It shall be watered and thoroughly compacted before placing the concrete. All soft and spongy material shall be removed to a depth of not less than six (6) inches below subgrade elevation for curbs and gutters and valley gutters, and three (3) inches below subgrade for sidewalks and mowstrips. The resulting space shall be filled with earth, sand or gravel of a quality that when moistened and compacted will form a stable foundation. Subgrade below curbs and gutters and valley gutters shall be compacted to a minimum ninety five (95) percent relative compaction as determined by Caltrans California Test Method 216, Test Method 231, or ASTM D1557. Subgrade below sidewalks and mowstrips shall be compacted to ninety (90) percent relative compaction. The subgrade shall be moistened immediately in advance of placing concrete.

27-4 Existing Curbs, Gutters, Valley Gutters, Sidewalks and Mowstrip

Where the Plans provide for the reconstruction of a portion of an existing curb, gutter, valley gutter, sidewalk or mowstrip, the existing section shall be cut to a minimum depth of one and one-half (1½) inches with an abrasive type saw at the line shown on the Plans or as determined by the Engineer, and the entire section to be reconstructed shall be removed. The new curb, gutter, valley gutter, sidewalk or mowstrip shall join the original at this line. When sawcutting valley gutters containing bar reinforcement, care shall be taken not to cut the bars but to leave sufficient length (six (6) inches minimum) to tie to replacement reinforcement.

27-5 Forms

Forms shall conform to the requirements of Section 12-5, "Forms". Forms shall be true and shall have a smooth, straight upper edge. The contractor shall not place concrete in the forms until the forms have been approved for line and grade by the Engineer.

Edges of existing adjacent improvements may not be used as forms, such as when replacing curb and gutter or a valley gutter in an existing paved street, the existing pavement edge shall not be used as the outside form for the new improvement. The pavement shall be removed to the limits prescribed in the permit issued by the jurisdictional agency, and forms conforming to said Section 12-5 installed. Where new concrete improvements will join existing, such as replacing a segment of sidewalk or mowstrip, or where sidewalk is placed adjacent to curbs, unless otherwise shown on the Plans or specified in the Special Provisions or directed by the Engineer, the existing improvement may be used as a form.

Timber forms shall be surfaced on the side placed next to the concrete, and shall have a true surfaced upper edge and shall not be less than one and one-half (1½) inches thick after being surfaced.

All forms shall be thoroughly cleaned and coated to prevent the concrete from adhering to them.

The depth of forms for back of curbs shall be equal to the full depth of the curb. The depth of face forms for concrete curbs shall be equal to the full face height of the curb.

Forms shall be carefully set to alignment and grade and shall conform to the required dimensions. Forms shall be held rigidly in place by iron stakes placed at intervals not to exceed four (4) feet. Clamps, spreaders and bracers shall be used where required to ensure rigidity in the forms.

Benders or thin plank forms may be used on curves, grade changes or for curb returns.

The form on the front of curbs shall not be removed until the concrete is sufficiently set.

27-6 Expansion Joints

Expansion joints shall conform to the applicable requirements of the agency having jurisdiction for issuing the permit for performing the work, or, in the absence of such requirements, shall be as specified in this Section 27-6.

For curbs, gutters, and sidewalks, expansion joints consisting of a pre-molded joint filler three-eighths ($\frac{3}{8}$) inch thick shall be constructed at no greater than forty-five (45) foot intervals and at the ends of all curb returns. Weakened plane joints shall be constructed at twenty (20) foot intervals along the Work. Expansion joints in curbs, gutters and sidewalks shall be placed opposite each other.

For mowstrips, expansion joints consisting of a pre-molded joint filler three-eighths ($\frac{3}{8}$) inch thick shall be constructed at forty (40) foot intervals along the Work. When possible, said location of expansion joints shall be centered between fence posts. Weakened plane joints shall be constructed at twenty (20) foot intervals.

All joints shall be constructed at right angles to the line of the curb, sidewalk or mowstrip.

The expansion joint filler shall be shaped to the cross section of the curb, gutter, sidewalk and mowstrip. The top edge shall be placed one-fourth ($\frac{1}{4}$) inch below all concrete surfaces.

27-7 Construction of Curbs and Gutters

Concrete shall be placed in the curb forms in layers not exceeding six (6) inches in depth. The forms shall be filled to the top and the concrete shall be so handled that there will be no rock pockets. Concrete may be consolidated by means of mechanical vibrators approved by the Engineer. Special "wedge-type" curb and gutter, or other modified curb and gutter, will require special treatment and forming to match the curb face opening of storm drain inlets.

Immediately after removing the front curb forms, the face of the curb shall be troweled smooth to the flow line of integral curb and gutter, and then finished with a steel trowel. The top shall be finished and the front and back edges rounded as shown on the applicable Standard Plans and Project Plans.

After the face of the curb has been troweled smooth, it shall be given a final light brush finish with brush strokes parallel to the line of the curb.

The top and face of the finished curb shall be true and straight, and the top surface of curbs and gutters shall be of uniform width except where tapered as necessary to fit storm drain inlets. The surface of the gutter shall be finished to such uniformity that it will not vary more than one-eighth ($\frac{1}{8}$) inch from the edge of a ten (10) foot long metal straight edge, except at changes of grade. No appreciable pockets of water shall be left standing after a water test, which the Contractor shall perform before acceptance of the Work. Any high or low areas causing ponding of water shall be removed and replaced to the limits determined by the Engineer and re-tested.

When curbs and gutters are to be constructed alongside of each other, they shall be poured and finished as a monolith.

27-8 Construction of Sidewalks and Mowstrips

After the concrete for a sidewalk or mowstrip has been placed, the concrete shall be struck off to proper section and consolidated with a grid of parallel metal bars or other approved device until a layer of mortar not less than three-eighths ($\frac{3}{8}$) inch thick has been brought to the surface.

The surface shall then be finished to grade and cross section with a wooden float. After floating, the surface shall be given a steel trowel finish to produce a dense uniform surface free from blemishes, ripples and trowel marks, followed by steel troweling a medium sweat or scroll finish to produce a non-slick surface. Water, if necessary, shall be applied to the surface immediately in advance of final troweling.

The surface of sidewalks shall be scribed in accordance with adjoining sidewalks or City or County standards, the scribing to be done with a tool which will leave the edges along the scribe line rounded and in uniform depth and appearance.

When a ten (10) foot long metal straight-edge is placed on the sidewalk in any direction, the surface shall not vary more than one-eighth ($\frac{1}{8}$) inch from the edge of the straight-edge, except at

grade changes, and the finished surface shall be free from blemishes. Any sidewalk found out of compliance with this requirement shall be removed to the limits determined by the Engineer, replaced by the Contractor, and re-tested.

27-9 Construction of Valley Gutters

Unless otherwise shown on the Plans or specified in the Special Provisions or the permit issued by the jurisdictional agency, valley gutters or portions thereof removed in the performance of the Work shall be replaced in a manner that matches the prior existing facility. Where only a portion of the existing valley gutter is to be replaced, any steel reinforcement shall be exposed at least twelve (12) inches and tied to the new reinforcement in the replacement section. The new concrete shall be given a medium broom non-skid finish.

If the valley gutter or portion thereof to be replaced is monolithic with the curb return and related sidewalk, that portion shall also be replaced in accordance with the jurisdictional agency permit. If the existing curb return and sidewalk contained a handicap ramp(s), the ramp(s) shall be reinstalled in conformance with the latest Federal Standard, regardless of the form of the previously existing ramp(s).

27-10 Curing

Concrete shall be cured in accordance with the requirements of Section 12-6, "Curing Concrete".

27-11 Backfill and Compaction

Backfill required to be placed behind or between the new concrete improvements and compaction thereof shall conform to Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction", unless otherwise shown on the Plans or specified in the Special Provisions or jurisdictional agency permit.

27-12 Measurement and Payment

Unless otherwise specified in the Special Provisions, the length of concrete curbs, gutters and mowstrips to be paid for shall be the length in feet as measured by the Engineer. The area of concrete sidewalks and valley gutters to be paid for shall be the area in square feet as measured by the Engineer, unless otherwise specified in the Special Provisions.

The price paid per lineal foot of concrete curb, gutter or mowstrip and the price paid per square foot of concrete sidewalks and valley gutters shall include full compensation for furnishing all labor, material, tools and equipment and doing all the work involved in constructing or reconstructing concrete curbs, gutters, mowstrips, valley gutters and sidewalks, including subgrade preparation and curing, and shall also include the removal of existing concrete where said concrete is to be replaced. Compensation for steel reinforcement required for concrete valley gutters, or other facilities requiring steel reinforcement, shall be included in the cost for valley gutters or other facilities requiring steel reinforcement, and no additional payment will be made therefor.

SECTION 28 - CHAIN LINK FENCE AND GATES**28-1 General**

This work shall consist of furnishing all labor, materials, tools and equipment for constructing Chain Link Fence and Gates at the locations shown on the Project Plans or specified in the Special Provisions. Chain Link Fence and Gates shall be constructed and furnished in accordance with the details shown on the Project Plans and applicable Standard Plans, and as specified in the Special Provisions and these Specifications.

28-2 Materials

All ferrous materials shall be new and galvanized. Defective galvanized material or material upon which serious abrasions of the galvanizing occur, or any damaged vinyl coated material, all as determined by the Engineer, shall not be used in the Work. Reference is made to Section 28-6, "Damage to Galvanized Material".

A certificate of compliance may be required from the manufacturer of all products used in constructing Chain Link Fence and Gates, including posts, and shall be submitted to the Engineer in conformance with Section 6-5, "Certificates of Compliance". Materials used for the construction of Chain Link Fence and Gates shall comply with the following provisions.

28-2.01 Height

Unless otherwise shown on the Plans or specified in the Special Provisions, Chain Link Fence and accompanying Gates shall stand at a height of six (6) feet above the grade indicated on the Plans when erected.

28-2.02 Fabric**28-2.02.1 Galvanized Fabric**

Chain Link Fence and Gate fabric shall conform to the specifications of ASTM Designation: A392, Class 1 zinc coating. The wire used in the manufacture of the fabric shall be nine (9) gauge, and woven into approximately two (2) inch mesh. The upper edges of the fabric shall have the wire ends bent back to form a closed loop (knuckled).

28-2.02.2 Vinyl Coated Galvanized Fabric

Where shown on the Plans or specified in the Special Provisions to be installed, Vinyl Coated galvanized Chain Link Fence and Gate fabric shall conform to the following specifications:

The underlying fence and gate fabric wire shall be galvanized and meet the requirements of ASTM Designation: A392, Class 1 zinc coating. The wire used in the manufacture of the fabric shall be eleven (11) gauge, and woven into approximately two (2) inch mesh. The upper edges of the fabric shall have the wire ends bent back to form a closed loop (knuckled).

Unless otherwise shown on the Plans or specified in the Special Provisions, the Vinyl Coating shall be black in color and conform to ASTM Designation F668-07, Class 2(b) polymer coating, fused and adhered to the zinc coated fabric. The coated fabric wire shall have an eight (8) gauge minimum finish thickness.

28-2.03 Posts and Braces

All posts, braces, and frames shall be round steel pipe only. Use of other geometric shapes will not be permitted. The base material for the manufacture of steel pipe used for posts and braces shall conform to the specifications of ASTM Designation: A53, with weights as shown in the table below. Posts and braces shall be galvanized in accordance with the specifications of ASTM Designation: A123.

Posts and braces shall conform to the following requirements:

Corner and End Posts	
2 $\frac{7}{8}$ " Outside Diameter (O.D.)	5.79 lb./ft. weight

Line Posts	
2 $\frac{3}{8}$ " O.D.	3.65 lb./ft. weight

Gate Posts		
Individual Gate Width	O.D.	Weight, lb./ft.
Up thru 6'	2 $\frac{7}{8}$ "	5.79
7' thru 13'	4"	9.11
14' thru 18'	6 $\frac{5}{8}$ "	18.97
Over 18'	8 $\frac{5}{8}$ "	24.70

Braces	
1 $\frac{5}{8}$ " O.D.	2.27 lb./ft. weight

All posts shall be fitted with rainproof caps designed so as to fit securely over the top of the posts, and carry the top tension wire, and shall allow removal and replacement of a post without disturbing the top tension wire.

All posts shall be of a total length of not less than nine (9) feet as shown on the Standard Plans, except that where post caps are used which hold tension wires, the post may be shortened a sufficient amount so that the top of the cap is at the approximate level of the fence fabric, but no lower. In no case, however, shall the post be shorter than eight (8) feet-eight (8) inches where post caps are used, nor shall the length embedded in the concrete footing, including mowstrip, be less than three (3) feet.

28-2.03.1 Alternative Pipe

Alternative pipe material for fence posts, braces, and gate frames conforming to the following specifications will be permitted unless otherwise specified in the Special Provisions. Alternate pipe material for fence posts, braces and gate frames shall be Grade B steel. Grade B steel pipe shall conform with ASTM A653, Grade D, or ASTM A1011,

with a minimum yield strength of 50,000 PSI. The pipe exterior shall conform to ASTM F 1043, Type B hot dip galvanized .9 oz/sq foot zinc coating. The following shall apply to Grade B pipe:

<u>Location</u>	<u>O.D.</u>	<u>Weight, lb./ft.</u>
Corner and End Posts	2 ⁷ / ₈ "	4.64
Line Posts	2 ³ / ₈ "	3.12

<u>Gate Posts</u>		
<u>Individual Gate Width</u>	<u>O.D.</u>	<u>Weight, lb/ft</u>
Up thru 6'	2 ⁷ / ₈ "	4.64
7' thru 13'	4"	6.56
14' thru 18'	6 ⁵ / ₈ "	18.02
Over 18'	8 ⁵ / ₈ "	27.12

28-2.04 Extension Arms

Extension arms, stretcher bars and other required fittings and hardware shall be steel or malleable iron or wrought iron and shall be galvanized in accordance with the specifications of ASTM Designation: A153. Extension arms for barbed wire shall be furnished and installed at the angle shown on the Plans, as specified in the Special Provisions, or as specified in Section 26-10, "Fence Enclosure".

28-2.05 Tension Wire, Tie Wire

Tension wires shall be a minimum of seven (7) gage (0.177" dia.) coil spring steel of good commercial quality. Tie wires and hog rings shall be at least nine (9) gage (0.148" dia.) steel. Tension wires, tie wires, and hog rings shall be galvanized in accordance with the provisions of ASTM Designation: A116, Coating Class 3.

28-2.06 Barbed Wire

Barbed wire, where required, shall be zinc coated and shall consist of three (3) strands of 12-1/2 gage wire with 14 gage two (2) or four (4) point barbs spaced approximately five inches (5") apart. Barbed wire shall conform to the specifications of ASTM Designation: A121, Class 1.

28-2.07 Gates

Drive gates shall be of the widths designated on the Plans or in the contract bid item. Walk gates shall be four (4) feet wide. Gates shall be constructed in accordance with the details shown on the Standard Plans.

Gate frames shall be constructed of not less than one and seven-eighths (1⁷/₈) inch I.D. galvanized standard weight pipe conforming to the specifications of ASTM Designation: A53. Gate frames shall be cross-trussed with three-eighths (3⁸/₈) inch adjustable truss rods. The adjuster shall be provided with flat and lock washers and shall be "double-nutted", as directed by the Engineer, to lock the adjuster. The corners of gate frames shall be fastened together and reinforced with a malleable iron fitting designed for the purpose, or they may be welded and re-galvanized as provided herein.

All abraded and damaged galvanized surfaces or welded areas shall be re-galvanized or, with the approval of the Engineer, may be repaired in conformance with Section 28-6, "Damage to Galvanized Materials".

The same type of Chain Link Fence fabric specified for the fence shall also be installed on the gate frames, using stretcher bars and the tie wires as specified for fence construction, and suitable tension connectors spaced at approximately one (1) foot intervals.

Each gate shall be hung by at least two (2) Bulldog Industrial hinges with one hundred eighty (180) degree adaptors not less than three (3) inches in width, or approved equal, so designed as to securely clamp to the gate posts and permit the gate to be swung back against the fence.

Drive gates shall be provided with a combination steel or malleable iron catch and locking attachment of approved design. Stops to hold gates open and a center rest with catch shall be provided for all double drive gates. Walk gates shall be provided with stops only.

28-2.08 Post Footings

Post footings shall be Class "B" concrete conforming to the requirements of Section 12, "Portland Cement Concrete; Cement Mortar", and to the details shown on the applicable Standard Plans.

28-3 Clearing and Grubbing

Clearing and Grubbing shall conform to the requirements of Section 13, "Clearing and Grubbing.

28-4 Excavation and Embankment Construction

Any excavation or embankment (fence pad) construction required to construct Chain Link Fence and Gates shall be to the lines and grades shown on the Plans or established by the Engineer. Excavation shall conform to the applicable portions of Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading", and embankment construction shall conform to the requirements of Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction".

28-5 Construction

Line posts shall be spaced not farther apart than ten (10) feet from center to center, and unless otherwise shown on the Plans or specified in the Special Provisions, shall be set vertically.

All posts shall be set in concrete footings conforming to details shown on the Standard Plans. Post pipe shall be placed centered in the footing excavation, and in such a manner that a minimum of two (2) inches of concrete separate the bottom of the post from the soil at the bottom of the footing excavation. Soil that has "sluffed" off into the footing excavation shall be removed so as to provide the full depth of concrete footing as shown on the Standard Plans. If directed by the Engineer, footings shall be crowned at the top to permit water to flow away from the posts. Unless otherwise indicated, the minimum relative compaction of the finished fence pad shall be ninety (90) percent.

End, corner and gate posts shall be braced to the nearest line post as shown on the Standard Plans, with horizontal braces used as compression members and galvanized three-eighths ($\frac{3}{8}$) inch steel adjustable truss rods used as tension members. The adjuster shall be provided with flat and lock washers, and shall be "double-nutted", as directed by the Engineer, to lock the adjuster. Where the distance between corner and/or gate posts is one thousand (1,000) feet or greater, line posts shall be braced horizontally and trussed in both directions at intervals not to exceed one thousand (1,000) feet, as shown on the Standard Plans. The tension wires shall be interrupted at this location by cutting and attaching them to one of the braced line posts. Tension wires shall then be continued from this same line post to the next corner or gate post.

Changes in fence alignment where the deflection angle is fifteen (15) degrees or more shall be considered as corners, and corner posts with bracing specified for corners shall be installed.

Chain link fabric shall be fastened on the side of the posts designated by the Engineer.

The fabric shall be stretched and securely fastened to the posts, and between posts the top and bottom edges of the fabric shall be fastened to the tension wires. Tension wires shall be stretched tight and attached to corner or gate posts in a manner approved by the Engineer.

The fabric shall be fastened to end, corner and gate posts with one-fourth ($\frac{1}{4}$) inch by three-fourths ($\frac{3}{4}$) inch stretcher bars and not less than one-eighth ($\frac{1}{8}$) inch by three-fourths ($\frac{3}{4}$) inch stretcher bar bands spaced at one (1) foot intervals. The fabric shall be fastened to line posts with tie wires and to tension wires with hog rings. The tie wire shall be evenly spaced on line posts, with a minimum of six (6) per post. Hog rings shall be spaced a maximum of eighteen (18) inches apart on tension wires with a minimum of six (6) per ten (10) foot panel. The ends of tie wires shall be bent back (knuckled).

All bolted fixtures, including gate hinge attachments, turnbuckles, or other adjusters, clamps, or any device which is bolted, shall be provided with flat washers behind bolt heads, except where stove bolts are used, and flat and lock washers behind nuts. All turnbuckles or other adjusters shall be "double-nutted" to lock the adjuster.

The area around each gate shall be graded to allow all gates to be swung back against the fence without dragging on the ground surface.

Where post extensions and barbed wire are specified, the barbed wire shall be stretched tight and fastened to extension arms with tie wires or hog rings. Where the wire terminates, it shall be securely tied to the extension arm.

28-6 Damage to Galvanized Materials

As specified by Section 28-2, "Materials", any seriously damaged or abraded galvanized surfaces shall not be used in the work. Damaged or abraded galvanized surfaces not deemed serious by the Engineer shall be repaired by thoroughly wire brushing the damaged areas and removing loose and cracked coating, after which the cleaned areas shall be painted with two (2) applications of zinc oxide, zinc dust paint conforming to the requirements of Federal speci-

fication MIL-P-15145, the paint to be properly compounded in a suitable vehicle in the ratio of one (1) part zinc oxide to four (4) parts zinc dust, by weight.

28-7 Measurement

Quantities of Chain Link Fence will be measured by the lineal foot to be determined from actual measurements. The width of gate openings will be deducted.

Quantities of Gates will be determined from actual count. A gate unit complete in place shall include one (1) gate, or in the case of double gates, one (1) double unit, with all necessary fittings, hardware, and gate posts with braces, latches, stops, and other devices required by the Standard Plans or project plans, or these Specifications. Measurement of Excavation and Embankment will be made commensurate with the method of payment.

28-8 Payment

The price paid per lineal foot of Chain Link Fence and the unit price paid for Gates or double gate units, shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in installing the fence and gates in place, including braces, tension wire, post caps, tie wire, truss rods, post extension arms and barbed wire when required, and any and all incidentals required for furnishing and installing Chain Link Fence and Gates complete.

The cost of clearing and grubbing, excavation and embankment (fence pad) construction, and any other grading work necessary to construct fences and gates shall be included in the lump sum or other unit price specified and bid therefor, and no additional payment will be made therefor.

If no bid item is provided for clearing and grubbing or excavation and embankment (fence pad) construction, unless otherwise specified in the Special Provisions, the cost of clearing and grubbing, excavation, and embankment construction, and any grading or other work required to construct fences or gates shall be included in the price bid for fence construction, and no additional payment to be made therefor.

SECTION 29 – ORNAMENTAL METAL FENCE and GATES**29-1 General**

This work shall consist of furnishing all labor, materials, tools and equipment for constructing and furnishing Ornamental Metal Fence and Gates at the locations shown on the Project Plans or specified in the Special Provisions. Ornamental Metal Fence and Gates shall be manufactured, constructed, and installed in accordance with the details shown on the applicable Standard Plans and Project Plans, and as specified in the Special Provisions and these Specifications.

29-2 Materials

All fence and gate materials shall be made of new steel. Posts, pickets and rails shall be tubular steel conforming as a minimum to ASTM Designation F 2589-06 or latest amendment, and shall have a minimum yield strength of 45,000 psi.

Gate hinges, gate latches, and post caps shall be steel. Picket caps may be either plastic or metal.

Rail-to-post brackets for the attachment of fence panels to posts shall be eleven (11) gauge or greater thickness steel, and shall have a minimum yield strength of 45,000 psi.

A certificate of compliance may be required from the manufacturer or supplier of all products used in constructing Ornamental Metal Fence and Gates including, but not limited to, posts, rails, pickets, and brackets. Certificates shall be submitted to the Engineer in conformance with Section 6-5, "Certificates of Compliance". Ornamental Metal Fence and Gate materials shall also comply with the following specifications:

29-2.01 Height

Unless otherwise shown on the Plans or specified in the Special Provisions, Ornamental Metal Fence and any accompanying Gates when erected shall stand at a height of six (6) feet above the grade indicated on the Plans.

29-2.02 Pickets

Pickets for fence or gate panels shall be three-fourths ($\frac{3}{4}$) inch square tubular steel, twelve (12) gauge. Pickets shall be pre-cut to the specified length as shown on the Standard Plans. Where a fence height less than six (6) feet is shown on the Plans or specified in the Special Provisions, picket size shall not change except for length. For fence heights greater than six (6) feet, picket size shall be as shown on the Plans or specified in the Special Provisions. All pickets shall be fitted with rainproof plastic or metal caps.

29-2.03 Horizontal Rails

Horizontal rails for fence and gate panels shall be one and three-fourths ($1\frac{3}{4}$) inches square tubular steel, eleven (11) gauge. Rails shall be pre-cut to lengths necessary to fit post spacing as shown on the applicable Standard Plans.

Where a fence height less than six (6) feet, or post spacing less than eight (8) feet, is shown on the Plans or specified in the Special Provisions, rail size shall not change except for length in the case of shorter post spacing.

Where a fence height greater than six (6) feet, or post spacing greater than eight (8) feet, is shown on the Plans or specified in the Special Provisions, rail size and length shall be as shown on the Plans or specified in the Special Provisions.

29-2.04 Posts

29-2.04.1 Line Posts

Line posts shall be two and one-half (2½) inches square tubular steel, eleven (11) gauge, and pre-cut to specified lengths as shown on the Standard Plans. For post spacing less than eight (8) feet (for example at end fence panels), line post size shall not change. All line posts shall be fitted with rainproof pressed steel caps.

29-2.04.2 Corner, End, and Gate Posts

Unless otherwise shown on the Plans or specified in the Special Provisions, corner, end, and gate posts for a four (4) foot wide walk gate shall be three (3) inches square tubular steel, eleven (11) gauge, and pre-cut to lengths shown on the applicable Standard Plans. For fence panels less than eight (8) feet in length, such as end panels, corner or end post size shall not change. Gates greater than four (4) feet wide shall be a special design; gate post size shall be as shown on the Plans or specified in the Special Provisions.

All gate posts shall be fitted with rainproof pressed steel caps.

29-2.05 Post Footings

Post footings shall be constructed of Class "B" concrete conforming to the requirements of Section 12, Portland Cement Concrete; Cement Mortar", and to the details shown on the applicable Standard Plans.

29-3 Fabrication

29-3.01 Fence Panels

Fence panels shall consist of vertical pickets welded onto straight horizontal rails (or other angles where shown on the Plans or specified in the Special Provisions), complete in all respects and ready to be installed between pre-set posts.

Pickets shall be pre-cut to lengths necessary to achieve the vertical height of the fence as shown on the Standard Plans, or as shown on the Project Plans or specified in the Special Provisions, taking into account the longitudinal grade at which the fence is to be installed.

Rails shall be pre-cut to lengths necessary to fit post spacing as shown on the Standard Plans or the Project Plans. End fence panels shall be sized accordingly to fit between the last line post and the end or corner post. Pickets shall be attached to rails at intervals resulting in pickets being evenly spaced between posts. In calculating spacing, the distance as measured between picket centers as shown on the applicable Standard Plans shall not exceed four (4) inches. If the space between the center of the end picket and the outside edge of the post exceeds three and one-fourth (3¼) inches, an additional picket shall be installed as shown on the Standard Plans.

Pickets shall be welded to the outside face (the side facing away from the District's site being enclosed by the fence) of the upper and lower rails. Welds shall be on the inside face of the picket along the top and bottom of each rail. Assembly and welding of fence panels shall be performed on machinery or jigs that provide precise control of positioning and alignment of pickets to rails, and produces a rigid fence panel true in all dimensions conforming to the applicable Standard Plans, the Project Plans, these Specifications, and the Special Provisions.

29-3.02 Gate Panels

The standard gate opening shall be four (4) feet in width as shown on the applicable Standard Plans. Gates of greater widths shall be of special design, and shall be manufactured and installed in accordance with the Project Plans and Special Provisions.

Gate panels shall match the cross section of fence panels in all respects as to picket and rail sizes, materials, and height. Gate panels shall be fabricated in the same manner as fence panels as specified in Section 29-3.01, "Fence Panels", except that the horizontal rails for gate panels shall be closed at each end with a vertical section of rail as shown on the Standard Plans. The horizontal rails shall be welded between the two vertical rail sections to form a closed rigid gate panel frame. A three-fourths ($\frac{3}{4}$) inch, twelve (12) gauge, square tubular steel diagonal support shall be welded inside the gate frame as shown on the Standard Plans, with the outside edge of the picket in the same plane as the outside edge of the rail frame. Pickets shall then be welded to the outside face of the frame and diagonal brace in the same manner as welding of fence panels. Pickets shall be provided with rainproof plastic or metal caps. Gate Posts and vertical rails shall be provided with rainproof pressed steel caps

Each gate shall be provided with at least two (2) hinges specifically manufactured for Ornamental Metal Fences, appropriate in size for the weight of the specified gate. Hinges shall provide for welded attachment to posts and gate panels, and shall be manufactured and installed to allow gates to open one hundred eighty (180) degrees to permit the gate to be swung back against the fence. An approved pre-manufactured stop to hold the gate open shall be provided and installed.

Latches shall be specifically manufactured for Ornamental Metal Fences and Gates. The latch shall be of a "U" design, and shall have a padlock eye as an integral part of the latch. Latches shall provide for bolted attachment to the gate panel frame. Bolts shall be stainless steel.

29-4 Construction

Fence and gates shall be installed to the lines and grades shown on the Plans or specified in the Special Provisions. All posts shall be installed vertical regardless of grade unless otherwise shown on the Plans. The fence alignment shall be cleared in accordance with Section 13, "Clearing and Grubbing".

Corner, line, and gate posts shall be installed in accordance with the vertical and horizontal spacing shown on the applicable Standard Plans and the Project Plans. All posts shall be set in concrete footings conforming to details shown on the Standard Plans. Posts shall be placed

centered in the footing excavations, and in such a manner that a minimum of two (2) inches of concrete separate the bottom of the post from the soil at the bottom of the footing excavation. Soil that has “sluffed off” into the footing excavation shall be removed so as to provide the full depth of concrete footing as shown on the Standard Plans.

If directed by the Engineer, post footings shall be crowned at the top to permit water to flow away from the posts if the posts are not to be set in a concrete mowstrip or sidewalk. Where shown on the Plans or specified in the Special Provisions to be provided, concrete mowstrip or sidewalk shall be constructed in accordance with Section 27, “Curbs, Gutters, Valley Gutters, Sidewalks and Mowstrips”, to the lines and grades shown on the Project Plans and prior to assembly of fence and gate panels to posts.

Brackets for mounting fence panels to posts (rail-to-post brackets) shall be attached to posts and rails by welding. The type of bracket used shall comply with the applicable Standard Plan. All seams between brackets, posts, and rails shall be welded. Fence panel rails may also be directly welded to posts without using brackets provided that the ends of the rails bear directly on the post (no gap between the rail and post).

Hinges shall be attached to gate frames and posts by welding as shown on the applicable Standard Plan. All seams between the hinge, gate frame, and post shall be welded. Latches shall be attached to gate frames using stainless steel bolts of appropriate diameter commensurate with bolt-hole diameter in the latch. Nuts and washers shall also be stainless steel. Care shall be taken not to bend or collapse gate frame rails by over-tightening the bolts.

The area around each gate shall be graded to allow the gate to be swung back against the fence to the gate stop without dragging on the ground surface.

29-5 Finish Coating

All fence and gate component surfaces shall be cleaned, primer coated, and painted in compliance with Section 32, “Painting”. The finish color shall be black, with an eggshell or semi-gloss sheen.

29-6 Excavation and Embankment Construction

Any excavation or embankment (fence pad) construction required to construct Ornamental Metal Fence and Gates shall be to the lines and grades shown on the Plans or established by the Engineer. Excavation shall conform to the applicable portions of Section 14, “Trench and Structure Excavation, Retention Basin Excavation and Grading”, and embankment construction shall conform to the requirements of Section 15, “Trench and Structure Backfill, Retention Basin Embankment Construction”.

29-7 Measurement

Quantities of Ornamental Metal Fence will be measured by the lineal foot which will be determined from actual measurements. The width of gate openings will be deducted.

Quantities of Ornamental Metal Gates will be determined from actual count. A gate unit complete in place shall include one (1) gate with all necessary fittings, hardware, gate posts,

hinges, latches, stops, and any other components required by the Standard Plans or Project Plans, or these Specifications.

29-8 Payment

The price paid per lineal foot of Ornamental Metal Fence and the unit price paid for Ornamental Metal Gate shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work involved in furnishing and installing the fence and gates in place including, but not limited to, fence and gate panels, posts, picket and post caps, hinges, latches, brackets, bolts, nuts and washers, footings, cleaning, priming and painting, and any and all incidentals required for furnishing and installing Ornamental Metal Fence and Gates complete.

Unless otherwise specified in the Special Provisions, the cost of clearing and grubbing, excavation, and embankment construction, and any grading or other work required to construct fences or gates shall be included in the price paid for fence and gate construction with no separate payment to be made therefor.

The cost of clearing and grubbing, excavation and embankment (fence pad) construction, and any other grading work necessary to construct fences and gates shall be included in the lump sum or other unit price specified to be bid therefor, and no additional payment will be made therefor.

If no bid item is provided for clearing and grubbing or excavation and embankment (fence pad) construction, unless otherwise specified in the Special Provisions, the cost of clearing and grubbing, excavation and embankment (fence pad) construction, and any other grading or other work required to construct fences or gates shall be included in the price bid for fence construction, and no additional payment will be made therefor.

SECTION 30 – LANDSCAPE IRRIGATION SYSTEM**30-1 General**

This Work shall consist of providing all labor, material, tools and equipment, and all incidentals and services required to install an automatic Landscape Irrigation System (Irrigation System) complete in all respects as shown on the Plans, specified in the Special Provisions and the Irrigation System Specifications and Electrical Specifications included in the Special Provisions, and these Specifications, and as directed by the Engineer. The Work shall include, but not be limited to, installation of all pipelines, thrust blocks, fittings, all types of sprinkler heads, automatic valves and valve boxes, automatic irrigation controllers, booster or reclaimed water supply pump controllers where specified, associated wiring, remote control telemetry equipment where required, booster pumps or reclaimed water supply pumps and filtration systems where specified, electrical supply service and electrical panels, all related electrical work, any required chain link fence enclosures, concrete slabs, making connections to the local jurisdiction water supply system, providing backflow prevention devices, pressure testing of the irrigation system, and furnishing as-built drawings and operations and maintenance manuals.

Reference is made to Section 2-4, “Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions”, and Section 2-5, “Pre-bid Tests”. Prior to submitting a bid, the Contractor shall have visited the site and conducted any tests deemed necessary to fully inform itself of conditions to be encountered during the progress of the Work. No additional payment will be made due to soil or other conditions differing from those anticipated by the Contractor.

30-2 Permits

Reference is made to Section 7-10, “Permits, Licenses, and Fees”. All Work called for on the Plans, specified in the Special Provisions, shown in any detail drawings, or specified in these Specifications, shall be executed in accordance with all governing ordinances, laws and regulations, and shall meet all jurisdictional agency conditions including obtaining Plumbing, Electrical, and Encroachment Permits, and paying all fees required by the jurisdictional agency. Any changes and/or additions in the Work necessary to meet the conditions of permits, ordinances, laws, regulations and/or other conditions imposed by the jurisdictional agency will be made by the Contractor without additional expense to the District, but such changes shall have the prior written approval of the Engineer.

The District shall obtain at its expense the PG&E Rule 16 for electrical service, and the authorization for water service from the jurisdictional agency. Any construction-related conditions or requirements associated with the electrical service installation or making the water supply connection are to be carried out by the Contractor, and the cost thereof included in the lump sum price bid for furnishing the Irrigation System and no additional payment will be made therefor. Reference is made to Section 30-4.18, “Electrical Power Supply”, Section 30-9, “Power Supply Installation”, and Section 30-10, “Water Supply Connection”.

30-2.01 Permit Inspections

Inspections of the Work required by the jurisdictional agency, including plumbing, electrical, building, water system or other inspections, shall be arranged for by the Contractor in advance and within the times prescribed by the jurisdictional agency. The Contractor shall be present at any such inspections. The Contractor shall also notify the Engineer twenty-four (24) hours prior to any such inspections. Any additional work or furnishing of materials required due to inspection by the authorities of the jurisdictional agency shall be furnished by the Contractor at no additional cost to the District. Any necessary re-excavations or alterations of the system required due to the failure of the Contractor to order such inspections shall be performed at the Contractor's expense.

30-2.02 Work Inspections

Periodic inspections of the Work shall be required for basic operations and installations during the progress of the Work. These are in addition to any of the permit inspections as provided in Section 30-2.01, "Permit Inspections". Such inspections will include, but not be limited to, the following:

- a. Verification of Finish Grading
- b. Layout and flagging of sprinkler heads and piping system;
- c. Trenching;
- d. Pipe and wire placement;
- e. Partial fill compaction of trenches, initial backfill;
- f. Automatic Control Valve installation;
- g. Electrical service and electrical panel installation;
- h. Automatic Controller installation and operation;
- i. Booster Pump and Backflow Preventer installation;
- j. Water service installation;
- k. Pressure test;
- l. Sprinkler Coverage test.

A final inspection of the Work shall be made by the Engineer at the time when all Work as shown on the Plans and specified in the Special Provisions has been completed. The Contractor shall notify the Engineer a minimum of twenty-four (24) hours in advance of the requested inspection.

30-3 Intent of Design

The intent of the Plans, Special Provisions and these Specifications is to include everything obviously requisite and necessary for the proper and complete installation of the Work, whether each necessary item is specifically mentioned therein or not. The objective is to provide an assembled and installed fully operational automated Irrigation System, which meets all applicable codes, will operate in a manner that efficiently irrigates all areas to be covered in full conformance with the Plans, Special Provisions, and these Specifications, and in all respects satisfactory to the District.

30-3.01 Project Plans

The Project Plans are generally diagrammatic and indicative of the Work to be performed. The Contractor shall carefully investigate the structural and finished conditions affecting the Work, and plan its Work accordingly, to avoid conflicts between irrigation systems, lighting systems, plantings, or architectural features, and furnish all pipe and fittings as are necessary to accomplish the finished condition. The Contractor shall verify finish grades within the Work area to ensure the proper soil coverage specified for irrigation pipes and facilities.

All work called for on the Project Plans by notes shall be furnished and installed whether or not specifically mentioned in the specifications.

The Contractor shall not willfully install the irrigation facilities as indicated on the Project Plans when it is obvious in the field that unknown obstructions that might not have been considered in the engineering. Such obstructions or differences should be brought to the attention to the Engineer.

30-4 Materials

Any material specified by name and/or model number on the Plans or specified by the Irrigation System and Electrical Specifications included in the Special Provisions, or in these Specifications shall be deemed to be used for the purpose of identifying the materials and insuring the specific use of that material in the construction of the system. All materials used in the system shall be new and without flaws or defects of any type and shall be the best of their class and kind. All materials shall have a minimum guarantee of one (1) year against material defects or defective workmanship. Reference is made to Section 30-5, "Handling of Materials".

Wherever such terms as "or equal" or "approved equal" or other terms of a similar meaning are used in the specifications or on the Plans, they shall mean:

- a. Equal in the quality of materials used, in structural strength and in detail of construction.
- b. Equal in performance, mechanically and technically.
- c. Equal in finish, or in characteristics permitting the specified finish to be applied.
- d. Equal in arrangement of plan. If substitutions for specified projects require a rearrangement of pipe work, head spacing, etc., such rearrangement must, in the opinion of the Engineer, be equal in convenience and practicability to the original arrangement. If such arrangement is approved by the Engineer, and should it involve additional cost, such cost must be borne by the Contractor.
- e. Equal in price. Materials and equipment which are equal in quality and utility are competitive products and are approximately equal in price on the open market. If approval is requested for materials or equipment materially cheaper than the specified products, the District will feel free to prefer the specified product.

30-4.01 Substitutions

No substitutions will be permitted without prior written approval of the Engineer. If substitution of equipment or material is desired by the Contractor, sufficient descriptive literature and material samples must be furnished to establish the equipment or material as an

equal substitute. In addition, the Contractor must state his reasons for desiring substitute equipment or materials.

Equipment or materials installed or furnished without the prior written approval of the Engineer may be rejected and the Contractor will be required to remove such materials or equipment from the Work and install the equipment or materials shown on the Plans or specified in the Special Provisions or these Specifications.

30-4.02 Polyvinyl Chloride (PVC) Pipe

All plastic pipe shall conform to current National Sanitation Foundation (NSF), Iron Pipe Sizes (IPS) standards, and to ASTM D 1785-06 and ASTM D 2241-05 requirements. Pipe shall be of improved white rigid polyvinyl chloride compound as manufactured by Lasco, Apache, or approved equal.

PVC pipe shall be continuously marked with the following minimum identification:

- a. Manufacturer's name or trademark
- b. Nominal pipe size
- c. Schedule and type
- d. Pressure rating in psi
- e. NSF seal of approval

Pipe used in the Irrigation System shall comply with the following:

a. Mainline or pressure supply pipe.

All mainline or pressure supply line plastic pipe shall be as follows:

1½ inches and smaller: Schedule 40 solvent weld PVC 1120 high impact pipe.

2 inches and larger: Class 315 solvent weld or Class 200 "O" ring PVC 1120 high impact pipe.

b. Lateral-line pipe

All lateral line or non-pressure line plastic pipe shall be as follows:

1½ inches and smaller: Schedule 40 solvent weld PVC 1120 high impact pipe.

2 inches and larger: Class 315 solvent weld or Class 200 "O" ring PVC 1120 high impact pipe.

c. Recycled water pipe

Irrigation Systems may include dual water supply options, including use of storm or other waters collected and stored in the retention basin being irrigated, or recycled water available from other agencies. In this case, where designated on the Plans or specified in the Special Provisions, certain lines will require "purple pipe" and

irrigation heads, valve handles and valve boxes must be purple in color to designate the use of non-potable water within the system.

Pipes installed under driveways, sidewalks, or other paved surfaces shall be of the strength shown on the Plans or specified in the Special Provisions, but in no case shall be less than Schedule 40. Pipe shall be pressure tested pursuant to Section 30-13, "Pressure Test", prior to commencing paving operations.

30-4.03 PVC Fittings

All plastic fittings to be used on PVC pipe shall be white rigid Polyvinyl Chloride (PVC) combination Type I and II, Grade I standard weight. All plastic fittings and connectors shall be injection molded of an approved high tensile strength, high chemical resistance, high impact strength polyvinyl chloride compound as manufactured by Dura-Plastic Products, Inc., or approved equal. Threads required in plastic fittings shall also be injection molded. Fittings shall bear the manufacturer's name or trademark, material designation, size applicable (IPS) schedule, and NSF seal of approval.

Fittings one and one-half (1½) inches in diameter and smaller for PVC pipe shall be Schedule 40 and conform to ASTM D 2466-06.

Fittings two (2) inches in diameter or larger for PVC pipe shall be Schedule 80 and conform to ASTM D 2464-06.

Plastic fitting sockets must conform to the outside diameter of the PVC pipe as recommended by the pipe manufacturer. Rubber gasket fittings may be used and shall match the pressure rating or schedule of the pipe used. All fittings shall be identified as to pressure rating or schedule.

30-4.04 Plastic Pipe Cement

All socket type connections shall be joined using primer conforming to ASTM F656-08, and PVC solvent cement meeting the requirements of ASTM D 2564-04. The high chemical resistance of the pipe and fitting compounds specified in this Section 30 makes it mandatory that an aggressive colored primer, which is a true solvent for PVC, be used in conjunction with the solvent cement designed for the fit of pipe and fittings of each size range specified.

30-4.05 Galvanized Iron Pipe and Fittings

All Galvanized Iron Pipe shall be hot dip galvanized, standard weight, seamless or continuous weld SCH 40 steel threaded pipe conforming to ASTM A 53. Fittings shall be malleable iron, galvanized, SCH 40, threaded, with beaded pattern. Sealant for threaded galvanized pipe joints shall be teflon tape, Rectorseal or approved equal.

30-4.06 Risers and Nipples, Swing Joints

All risers and nipples, unless otherwise shown on the Plans or specified in the Special Provisions, shall be ASA Schedule 40, galvanized mild steel threaded pipe. All threaded fittings shall be galvanized malleable mild iron. Where specifically set forth on the Plans or in the Special Provisions, risers and swing joint nipples may be PVC, Schedule 80, threaded pipe. Fittings on such swing joints shall be Marlex Schedule 40 threaded elbows or street

elbows, or approved equal. Prefabricated swing joints meeting the requirements of this Section 30-4.06 may also be used.

30-4.07 Sprinkler Heads, Rotors, Spray Nozzles, Bubblers

Sprinkler Heads, Rotors, Spray Nozzles, and Bubblers shall be of the type and performance as listed in the applicable legends or as otherwise shown on the Plans, or as specified in the Special Provisions. Where recycled water is to be used, heads shall have purple caps.

30-4.08 Automatic Control Valves

Control Valves shall be electric automatic remote control valves of the type and performance as listed in the applicable legends or as otherwise shown on the Plans, or as specified in the Special Provisions. Each Automatic Control Valve shall be wired such that each one can be independently operated at the controller. Valve boxes conforming to Section 30-4.12 "Valve Boxes", shall be installed in accordance with Section 30-7.10, "Valve Box Installation", for each valve of the size and manufacture shown on the Plans or specified in the Special Provisions. Where recycled water is to be used to irrigate, the box and cover shall be purple in color.

30-4.09 Control Wiring (24 Volt)

Connections between the controller and Automatic Control Valves shall be 24 volt, direct burial AWG-UF, single solid copper wire, furnished and installed in accordance with local electrical codes, the Plans, and the Special Provisions. The wire shall be sized in accordance with the controller and valve manufacturer's recommendations, but no smaller than AWG No. 14, and shall be of a different color than the 110 volt service to controllers.

The 24 volt common ground shall be of one continual but different color than the other 24 volt wires and the 110 volt service, and shall be no smaller than AWG No. 12.

30-4.10 Automatic Controllers

Irrigation controllers shall be fully automatic in operation, and of the type and manufacture as shown on the Plans or specified in the Special Provisions. Controllers shall provide all necessary features for programming as is shown on the Project Plans or specified in the Special Provisions. The Controller shall be capable of automatic operation of, as a minimum, the number of stations of Automatic Control Valves as shown on the Plans. There shall be no time lags between sections or stations, and the controller shall be of a compatible type for operating the Automatic Control Valves furnished. A separate common wire shall be used for each controller where more than one controller is to be installed.

Each controller shall be certified by Underwriters' Laboratory and shall bear its seal of approval, and shall be encased in a sturdy, lockable, weatherproof mounting box and must be easily accessible for maintenance. Two sets of keys shall be provided to the Engineer. Reference is made to Section 30-8, "Automatic Controller Installation".

30-4.11 Gate Valves

Gate Valves for main lines shall be AWWA approved, non-rising stem, bronze fitted, and anchored on a four (4) inch thick concrete pad. The size of the valve shall be as shown on

the Plans or specified in the Special Provisions, and installed in a valve box of the size, type, and manufacture as specified in Section 30-4.12 “Valve Boxes”. Where recycled water is to be used to irrigate, valve handles shall be purple in color. Reference is made to Section 30-7.10, “Valve Box Installation”.

30-4.12 Valve Boxes

Valve boxes for gate valves, single Automatic Control Valves, and wire splice locations, shall be of the size, type, and manufacture shown on the Plans or specified in the Special Provisions, with the cover marked “Irrigation”. Where recycled water is to be used to irrigate, the Valve Box and cover shall be purple in color. Reference is made to Section 30-7.10, “Valve Box Installation”.

30-4.13 Water Meter Boxes

Water Meter Boxes shall be the size, type, and manufacture specified by the water system jurisdictional agency, or as shown on the Plans or specified in the Special Provisions, whichever is applicable. Reference is made to Section 30-10, “Water Supply Connection”.

30-4.14 Backflow Prevention Devices

Backflow Prevention Devices shall be the size, type and manufacture as shown on the Plans or specified in the Special Provisions. Such devices shall conform to the plumbing codes of the jurisdictional agency in which the project is located. The Backflow Prevention Device shall be installed downstream of water meters at the location shown on the Plans or as directed by the Engineer, but in any case, outside of the public right-of-way. The type of pipe connecting the Backflow Prevention Device to the water meter shall be as directed by the water system jurisdictional agency.

Within five (5) days following installation, the Backflow Prevention Device shall be tested by an approved AWWA Certified tester. The results shall be forwarded immediately after testing to the Engineer and the Water Division of the applicable jurisdictional agency. The irrigation system shall not be operated prior to approval of the Backflow Prevention Device by the Engineer.

30-4.15 Pressure Regulating Valve

The pressure regulating and pressure sustaining valve shall be of the size, type, manufacture, and performance as shown on the Plans or Specified in the Special Provisions.

30-4.16 Booster Pump

Where required, Booster Pumps utilized to stabilize or increase the pressure of the public water supply system shall provide high reliability and efficiency with stable operating pressures, shall be pre-fabricated and self-contained, meet all applicable codes and ordinances, and shall comply in all respects with all capacity and performance data included in the Plans and Special Provisions. The pump capacity, make, model and manufacturer, and all performance data shall be submitted to the Engineer for approval prior to installation. The Booster Pump shall include all necessary accessories, pipes and fittings, filters where required, electrical wiring and conduit complying with applicable codes and ordinances, all

for a complete and operable installation. Reference is made to Section 30-11, "Booster Pump Installation".

30-4.17 Recycled Water Pump

Where required, Recycled Water Pumps utilized to provide a water supply from water retained in a District retention basin, the pump and filter system shall include, as a minimum, any grading necessary for pump installation, mounting brackets or brace, discharge piping, air vacuum release valve, pressure reducing valve, check valve, poured in place concrete footing around pipes and for pipe support, thrust blocks, all electrical conduits necessary to operate pump and filter, along with all steel piping, pipe protective wrapping, control wires, conduits, fittings and all in place and operational, complete as shown on the Plans and specified in the Special Provisions. The pump and filter system shall meet all applicable codes and ordinances, and shall comply in all respects with all capacity and performance data included in the Plans and Special Provisions. The pump and filter capacity, make, model and manufacturer, and all performance data shall be submitted to the Engineer for approval prior to installation. Reference is made to Section 30-12, "Recycled Water Pump Installation".

30-4.18 Electrical Power Supply

All materials associated with providing the Electrical Power Supply to operate the complete Irrigation System including, but not limited to, wiring, conduits, cabinets, meter panel, splice boxes, and all incidentals related thereto, shall comply with the details shown on the Plans and the Electrical Specifications included in the Special Provisions. Reference is made to Section 30-9, "Power Supply Installation".

30-4.19 Remote Control Telemetry

Where shown on the Plans or specified in the Special Provisions to be installed, Remote Control Telemetry equipment shall be the type, make, and model shown or specified. This equipment must be compatible with existing District equipment; substitutions will not be allowed.

30-4.20 Concrete

Concrete used for equipment pads, slabs, or thrust blocks shall conform to Section 12, "Portland Cement Concrete; Cement Mortar".

30-5 Handling of Materials

The Contractor shall be responsible for executing correct procedures in loading, unloading, stacking, transporting, and handling all materials to be used in the Irrigation System. The Contractor shall avoid rough handling which could affect the useful life of materials. Pipe shall be handled in accordance with the manufacturer's recommendations on loading, unloading, and storage. Transporting or storage of PVC pipe shall be done in a manner that does not allow undue bending of the pipe.

30-6 Grading

Before installation of the Irrigation System is to begin, the entire area that is to be irrigated shall be cleared and grubbed in accordance with the applicable provisions of Section 10, "Underground Utilities", and Section 13, "Clearing and Grubbing". Prior to Grading operations,

all woody plant material not removed by Clearing and Grubbing, including any shrubs, vines, weeds, or any other unwanted growth, shall be removed. The site shall then be graded to lines and grades as shown on the Plans. Where no lines or grades for grading are shown on the Plans or specified in the Special Provisions, the site shall be brought to a smooth and even condition as directed by the Engineer. Filled areas shall be sufficiently compacted to prevent settlement when watered. Unless otherwise specified in the Special Provisions, grading shall be included in the lump sum price paid for Irrigation System, and no additional payment will be made therefor.

30-7 Irrigation System Installation

Installation of all facilities shall be in conformance with the details shown on the Plans, as specified in the Special Provisions and the Landscape Irrigation Specifications and Electrical Specifications included therein, the manufacturer's recommendations, as specified in this Section 30-7, and as directed by the Engineer.

30-7.01 Description

The Irrigation System, including all hydraulic and electrical components, shall be constructed to the sizes, grades and locations shown on the Plans and as specified in the Special Provisions or as directed by the Engineer. All materials and equipment shall be installed in a neat and workmanlike manner and shall follow the recommendations of the manufacturers of the materials.

Reference is made to Section 30-3, "Intent of Design". Irrigation lines shown on the Plans are generally diagrammatic, and indicate the work to be installed in the most direct and workmanlike manner, and to avoid conflicts between the sprinklers, planting, and architectural features. Connections and controls shall be functionally as shown on the Plans, but physically shall be the most direct and convenient method while imposing the least hydraulic friction.

The Contractor shall stake the location of all lines, heads, and other items prior to excavation, and make adjustments as necessary to accomplish the intent of the Plans. All adjustments shall have the advance approval of the Engineer and no additional payment will be made for such adjustments.

The Contractor shall install the Irrigation System such that all pipes, valves, sprinkler heads, and any other parts of the system will be at the planned elevations or depths as measured from finish grade of landscaping, not from the existing grade if different from finish grade.

30-7.02 System Excavation

Excavation for all pipes, wiring, structures or other facilities to be installed as part of the Work shall conform to the applicable provisions of Section 10, "Underground Utilities", Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading", and as provided in this Section 30-7.02. If there is a conflict with the utilities and the Irrigation System, the Contractor shall promptly notify the Engineer for instructions as to further action. Failure to do so will make Contractor liable for any and all damage thereto arising from his operations.

All excavation shall be open vertical construction, sufficiently wide to provide ample working space around the facility being installed and to provide ample space for backfilling operations. Trenches shall be excavated so as to provide a smooth and uniform bed for pipe. Any trenching method other than open vertical trenching will not be allowed without the written approval of the Engineer.

The trench for PVC pipe shall be excavated sufficiently to provide the following minimum cover over the top of the pipe:

- a. Main lines, lines upstream of control valves: twenty-four (24) inches cover;
- b. Non-pressure rotary pop-up lateral lines: eighteen (18) inches cover;
- c. Non-pressure pop-up spray or drip emitter lateral lines: twelve (12) inches cover;
- d. Lines located under paved areas: twenty-four (24) inches;

Maximum cover over pipes shall not exceed one (1) foot greater than the minimum specified cover. All measurements shall be from finish grade of the surface to be landscaped.

30-7.03 PVC Pipe Installation

PVC pipe shall be installed in compliance with the following:

The bottoms of trenches shall be free of rocks, clods, sharp-edged objects, and any other debris prior to placing pipe in the trench. Add clean material as necessary to provide uniform and firm bedding for pipes.

PVC pipe, except for pipe with "O" ring joints, shall run from side to side of the trench bottom (snaked), or follow the pipe manufacturer's recommendations if different, to allow for expansion and contraction. One (1) additional foot per one hundred (100) feet of pipe is the minimum requirement for snaking.

All pipes shall have a minimum of four (4) inches clearance from each other, and six (6) inches clearance from pipes of other trades. Parallel pipes shall not be installed directly over one another. Pipes shall not be placed in trenches where water is present, or when the air temperature is 32° F or below.

Pipes installed under driveways, sidewalks, or other paved surfaces shall be of the strength shown on the Plans or specified in the Special provisions, but in no case shall be less than Schedule 40. Pipe shall be pressure tested pursuant to Section 30-13, "Pressure Test", prior to commencing paving operations. Sleeves shall be placed at the size and locations where called for on the Project Plans.

Sprinkler valve control wires shall be placed in the mainline or pressure supply line trench alongside the pipe or buried at a minimum depth of twenty-four (24) inches.

All changes in direction shall be accomplished using fittings and not bending. On all mainline cemented or "O" ring PVC water lines, the Contractor shall furnish and install

thrust blocks at all changes in direction of piping and at all connections or branches from the mainline. Thrust blocks shall be formed by pouring concrete between the pipe and trench wall. Thrust blocks shall be of adequate size and so placed as to take all thrusts created by the maximum internal water pressure. The thrust blocks shall be sized and placed in accordance with the pipe manufacturer's recommendation or as shown on the Project Plans or detailed drawings.

Temporary caps or plugs shall be placed on any openings in the pipes to prevent the intrusion of soil or other debris before the opening is permanently closed. All main and lateral lines shall be thoroughly flushed prior to the installation of any automatic valves or sprinkler heads.

Reference is made to Section 30-7.12, "System Backfill", and Section 30-13, "Pressure Test".

30-7.04 PVC to PVC Pipe Jointing

Jointing, in general, shall be performed by competent tradesmen specially trained in this type of Work and using tools and equipment recommended by the manufacturers of the pipe, fittings or equipment. As a minimum, the following procedures shall be used:

PVC pipe shall be cut with an appropriate tool in a manner so as to insure a square cut. All pipe shall be reamed and rough edges or burrs at cut ends shall be removed prior to installation so that the pipe interior shall be smooth, and an unobstructed flow will be obtained.

All PVC to PVC joints shall be solvent-welded. All primer and solvent cement shall comply with Section 30-4.04, "Plastic Pipe Cement". Only the solvent recommended by the pipe manufacturer and which complies with said Section 30-4.04 shall be used. The solvent-weld joints shall be made in the following manner:

- a. Thoroughly clean the mating pipe and fitting with a clean, dry cloth.
- b. Apply an even coat of colored cement primer to the external pipe end and interior of the fitting.
- c. Apply a uniform coat of solvent to the outside of the pipe with a non-synthetic bristle brush.
- d. Apply solvent to the inside of the fitting in a similar manner.
- e. Reapply a light coat of solvent to the pipe and quickly insert it into the fitting. Care should be taken so as not to use an excess amount of solvent, thereby causing a burr or obstruction to form on the inside of the pipe.
- f. Give the pipe or fitting a quarter turn to ensure even distribution of the solvent and make sure the pipe is inserted to the full depth of the fitting socket.
- g. Hold in position for fifteen (15) seconds.
- h. Using a clean rag, wipe off excess solvent that appears at the outer shoulder of the fittings.
- i. Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.
- j. Allow at least fifteen (15) minutes setup time for each welded joint before moving.

The joints shall be allowed to set at least twenty-four (24) hours before pressure is applied to the system.

30-7.05 PVC to Galvanized Pipe Connections

At all PVC pipe connections to galvanized steel pipe, the Contractor shall complete the steel connections first. Connections shall always be plastic into steel; never steel into plastic. A quality Teflon tape, recommended for use for such applications, shall be used on all threaded PVC to steel pipe joints, applied to the male threads only, and light wrench pressure is to be applied. Tape shall be a minimum of three-fourths ($\frac{3}{4}$) inch wide, and a minimum of two (2), maximum of three (3) wraps applied.

30-7.06 Galvanized to Galvanized Pipe Connections

All galvanized pipe shall be reamed and rough edges or burrs removed to allow a smooth and unobstructed water flow. Where pipe size changes are required, reducing fittings shall be used. Bushings shall not be used without the express approval of the Engineer. A quality Teflon tape recommended for use for such applications shall be used on all threaded galvanized steel to galvanized steel pipe joints, applied to the male threads only. Tape shall be minimum three-fourths ($\frac{3}{4}$) inch wide, and a minimum of two (2), maximum of three (3) wraps applied.

30-7.07 Sprinkler Heads, Rotors, Spray Nozzles, Bubblers Installation

Sprinkler Heads, Rotors, Spray Nozzles, and Bubblers that are furnished by the Contractor shall conform to Section 30-4.07, "Sprinkler Heads, Rotors, Spray Nozzles, Bubblers".

Locations of all sprinkler heads and related equipment shall be established by the Contractor at the time of construction. Typical spacing of the sprinkler heads are shown on the Plans and shall be exceeded only with written permission of the Engineer.

Rotary pop-up sprinkler heads adjacent to walks or mowstrips shall be set four (4) inches from edge of walk or mowstrip, and pop-up spray heads adjacent to walks or mowstrips shall be set one (1) inch minimum/two (2) inch maximum from edge of walk or mowstrip, unless otherwise shown on the Plans or specified in the Special Provisions.

The Contractor shall be responsible for correct tree bubbler locations. The Engineer will assist the Contractor in locating the proposed tree bubblers with drainage tube in the proposed lawn areas by marking their locations at the site if a request is made in writing. The Contractor shall give the Engineer a minimum of two (2) working days' notice for setting the bubbler locations. Bubblers shall be installed in accordance with the Standard Plan for Tree Planting unless otherwise shown on the Plans or specified in the Special Provisions.

30-7.08 Control Wiring Installation

Wiring shall occupy the same trench and shall be installed along the same route as the pressure supply routes whenever possible. Where more than one wire is placed in a trench, the wiring shall be taped together at intervals not exceeding ten (10) feet. Wires in conduits

shall not be taped together. Where wires do not share a trench with pipe, the trench shall be a minimum of twenty-four (24) inches deep.

Wires shall be laid from the control valve to the controller. An expansion loop of thirty-six (36) inches minimum shall be provided at each wire connection, splice, or directional turn, unless otherwise specified in the Special Provisions. All irrigation control wires shall be marked at the controller and each Automatic Control Valve with the number assigned to the particular valve. The marker shall be an approved wire marker.

A separate common wire shall be used for each controller where more than one controller is to be installed.

All wire shall be furnished in minimum two thousand five hundred (2,500) feet reels, and splicing shall be minimized, and shall only be made at remote control valves. Such splices shall be made waterproof with the use of "King One Step" model King-6 or 3M DBY direct bury twist-on water tight connector or approved equal kits. Where a splice in a field run is specifically approved by the Engineer, a valve box conforming to Section 30-4.12, "Valve Boxes", shall be provided at any approved splice location. Reference is made to Section 30-7.10, "Valve Box Installation".

Wiring to be installed under or across existing driveways, sidewalks, or other paved surfaces, or future improvements where shown on the Plans, shall be installed inside a PVC Schedule 40 Type II pipe sleeve. The PVC sleeve shall be placed a minimum of twenty-four (24) inches deep, and extend a minimum of twelve (12) inches beyond the edges of, the driveway, sidewalk, or other paved surface.

30-7.09 Automatic Control Valve Installation

Automatic Control Valves shall be installed where shown on the Plans and as field located by the Contractor and the Engineer. Valves shall be adjusted so that all heads operate within the pressure range recommended by the manufacturer. Automatic Control Valves shall be adjusted so that a uniform distribution of water is applied by the heads to the planting area of each individual valve system. The Contractor shall make all necessary connections for proper operation.

30-7.10 Valve Box Installation

Valve Boxes shall be set a minimum of three (3) inches below finish grade or other grade as shown on the Plans. Valve Box covers shall be fitted with a metal disk or steel reflector installed on the underside of the cover for electronic/metal detection. Only one Automatic Control Valve shall be installed in each Valve Box.

Valve Boxes shall be set on firm soil unless otherwise shown on the Plans or specified in the Special Provisions. Backfill carefully to prevent settlement and subsequent damage. Each Valve Box corner is to be set on a brick to prevent settling, with a minimum of one cubic foot of pea gravel installed below the valve.

The Contractor shall make a reference point to mark the location of all Irrigation Control Valves and Valve Boxes by chiseling a cross “+” on top of the concrete mowstrip at right angle to the valve. The Contractor shall make note of the distance from the edge of the mowstrip for the record drawing.

Where recycled water is to be used to irrigate, the box and cover shall be purple.

30-7.11 Assemblies Installation

Install all assemblies in accordance with the details shown on the Plans or specified in the Special Provisions and perform the work according to best standard practice, with prior approval. Install no multiple assemblies on PVC lines. Provide each assembly with its own outlet. No elbow, tee or valve shall be located closer than five (5) feet of each other.

30-7.12 System Backfill

Backfill of all excavations shall conform to applicable portions of Section 15, “Trench and Structure Backfill, Retention Basin Embankment Construction”, and the following requirements:

Backfilling of trenches containing PVC pipe shall be done when pipe is cool to avoid excessive contraction in cold weather. Such backfilling may be done in early morning hours or the pipe may be water cooled prior to backfilling procedures.

Backfill shall not be placed until the installed system has been, tested, inspected and approved by the Engineer. After the system has been inspected, and all corrections have been made to the satisfaction of the Engineer, an initial amount of backfill shall be placed and compacted under and around the pipes to provide support and sufficient weight to hold the pipes in place while pressure tests are performed in accordance with Section 30-13, “Pressure Test”. All joints are to be left exposed until completion of the tests and any repairs made and approved by the Engineer.

After completion of pressure testing, final backfill shall be returned to the trench or excavated area and compacted to a density similar to the adjacent soil level. Where hardpan or rocky conditions are present, selected material shall be used in filling from the bottom of the trench to a level four (4) inches above the top of the pipe. The remainder of the backfill may be made with native material, except that the top three (3) inches of backfill shall contain no rocks or hardpan chunks larger than one (1) inch in diameter. Backfill shall be compacted by jetting or flooding and wheel-rolling, or other approved means, except that for any trenches located within public right-of-way, jetting of backfill will not be permitted. The Contractor shall be responsible for trench settlement for a period of one (1) year after acceptance of the Work.

30-8 Automatic Controller Installation

Automatic Controllers of the size, type, and manufacture shall be furnished and installed in accordance with the details shown on the Plans or specified in the Special Provisions.

All irrigation control wires shall be marked at the controller and at each Automatic Control Valve site with the station number assigned to the particular valve. The marker shall be an approved wire marker.

In addition to the foregoing markers, the Contractor shall furnish and install inside each controller, in a water-tight plastic envelope, a controller schedule showing which valves are connected to which stations in the controller.

The Contractor shall also provide in each controller two (2) controller charts for each controller furnished. The chart shall show the area controlled by the automatic controller; the chart shall be the maximum size the controller door will allow, but shall be made readable. The chart shall be colored with a different color for each station. Reference is made to Section 30-16, "Operations and Maintenance Manual".

30-9 Power Supply Installation

The Contractor shall comply with the provisions of Section 7-10, "Permits, Licenses and Fees", and Section 30-2, "Permits", and obtain all necessary permits from the jurisdictional agency, including any required Electrical Permit, pay all fees associated therewith, and comply with all permit requirements. Electrical control panels shall be furnished and install as shown on the Plans and specified in the Special Provisions and the Electrical Specifications therein. All work associated with furnishing electrical power to service panels and equipment shall be done in accordance with the jurisdictional agency electric codes and in conformance with the PG&E Rule 16 requirements. In accordance with Section 7-32, "Electrical and Water Service", the District will make arrangements with the Utility Company for the permanent connections for electrical service and pay any fees associated therewith unless otherwise specified in the Special Provisions or shown on the Plans.

All electrical work shall also conform to the details shown on the Plans and specified by the Electrical Specifications included in the Special Provisions. Unless otherwise specified, all underground wiring shall be buried to a minimum depth of twenty-four (24) inches. Wire shall be furnished in minimum two thousand five hundred (2,500) feet reels and spliced only at junction boxes. All splices in wiring shall be made watertight using approved methods.

Cathodic (insulation) protection for conduits shall be provided where shown on the Plans or specified in the Special Provisions and shall be installed in accordance with the Uniform Plumbing Code. Unless otherwise specified in the Special Provisions, the cost for the Power Supply Installation shall be included in the lump sum price bid for the Irrigation System and no additional payment will be made therefor.

30-10 Water Supply Connection

In accordance with Section 7-32, "Electrical and Water Service", the District shall make arrangements with the jurisdictional agency for the permanent water connection and pay all fees associated therewith. The Contractor, however, shall comply with the provisions of Section 7-10, "Permits, Licenses and Fees", and Section 30-2, "Permits", and obtain any and all permits or licenses, including a Plumbing Permit where required and a Street Encroachment Permit from the jurisdictional agency, and shall pay all fees and charges associated therewith, including any

jurisdictional agency inspection fees, unless otherwise specified in the Special Provisions or shown on the Plans.

The installation of the Water Supply Connection complete, and furnishing all the materials therefor, shall be done in accordance with the details shown on the Plans and as specified in the Special provisions, and with any requirements of the jurisdictional agency when such requirements are not shown on the Plans or specified in the Special Provisions. Connections to the existing water supply shall be made at the approximate location shown on the drawings. Minor changes caused by actual site conditions shall be made by the Contractor without additional cost to the District. The Work shall conform to Section 14, "Trench and Structure Excavation, Retention Basin Excavation and Grading", Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction" Section 16, "Surface Restoration", and to jurisdictional agency permit requirements.

Unless otherwise specified in the Special Provisions, the Contractor shall pay the jurisdictional agency for all water used during the conduct of the Work, including water used to perform all tests. Unless otherwise specified in the Special Provisions, the cost for making the Water Supply Connection shall be included in the lump sum price bid for the Irrigation System and no additional payment will be made therefor.

30-11 Booster Pump Installation

Where required to be installed, the Booster Pump shall be furnished in accordance with Section 30-4.16, "Booster Pump", and installed by the Contractor at the location and in accordance with the details shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer. The installation shall include a pump and motor, concrete pad for mounting the pump and motor, all necessary plumbing to connect the pump to the Irrigation System, including a filter where required, electrical wiring and conduit, testing, and where shown on the Plans or specified in the Special Provisions, furnished with a weather-resistant rust-proof enclosure. The Contractor shall comply with all applicable codes and ordinances in the installation, and shall obtain all necessary permits for the Work in accordance with Section 7-10, "Permits, Licenses and Fees", and Section 30-2, "Permits"

All equipment furnished (except galvanized equipment) shall be painted in accordance with Section 32, "Painting". The Contractor shall protect existing facilities from damage during his operations and shall restore any improvements to original condition should damage occur.

Upon completion of the installation, the complete pump system shall be connected to the Irrigation System as shown on the Plans and tested for all performance criteria and for leaks. All repairs, adjustments, and replacements, shall be performed before completion of installation of the Irrigation System.

The cost for providing the complete Booster Pump installation as provided in this Section 30-11 shall be included in the lump sum price bid therefor. Where no bid item is provided, the cost shall be included in the lump sum price bid for Irrigation System, and no additional payment will be made therefor.

30-12 Recycled Water Pump Installation

Where required, the Recycled Water Pump shall be furnished in accordance with Section 30-4.17, "Recycled Water Pump", and installed by the Contractor at the location and in accordance with details shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer. The installation shall be a complete, efficient, functional and operational pumping system, including a filter system where required, and all necessary appurtenances to operate the pump.

The pump and motor, filter, and all other equipment shall be installed by the Contractor in conformance with the manufacturer's recommendations, and in compliance with all applicable codes and ordinances. The Contractor shall obtain all necessary permits for the Work in accordance with Section 7-10, "Permits, Licenses and Fees", and Section 30-2, "Permits".

The Contractor shall verify all dimensions to install the pump and related equipment shown on the Plans, and shall make any required adjustments to the pump installation as necessary to install the equipment according to the manufacturer's recommendations. The Contractor shall submit shop drawings for the pump and equipment layout to the Engineer for approval prior to ordering such equipment. The Contractor shall order the pump and filter, and any related accessories within ten (10) days of issuance of the Notice to Proceed in order to eliminate installation delays affecting the completion of the Work.

Backfill of all trenches and excavations shall conform to Section 15, "Trench and Structure Backfill, Retention Basin Embankment Construction".

Upon completion of the installation, the complete pump system shall be connected to the Irrigation System as shown on the Plans and tested for all performance criteria and for leaks. All repairs, adjustments, and replacements, shall be performed before completion of installation of the Irrigation System.

All equipment furnished (except galvanized equipment) shall be painted in accordance with Section 32, "Painting". The Contractor shall protect existing facilities from damage during his operations and shall restore any improvements to original condition should damage occur.

The cost for providing the complete Recycled Water Pump installation as provided in this Section 30-12 shall be included in the lump sum price bid therefor. Where no bid item is provided, the cost shall be included in the lump sum price bid for Irrigation System, and no additional payment will be made therefor.

30-13 Pressure Test

The Contractor shall furnish all labor, equipment and supplies to conduct a hydrostatic Pressure Test on the entire Irrigation System. The Engineer shall be notified a minimum of twenty-four (24) hours in advance of such tests. The test shall be performed in accordance with the following requirements:

Solvent welded PVC joints shall be allowed to set a minimum of twenty-four (24) hours prior to conducting a Pressure Test.

All pressure lines and PVC mainlines shall be tested under a hydrostatic (gage) pressure of one hundred twenty-five (125) psi. Pressure shall be maintained for a period of not less than twenty-four (24) hours.

PVC lateral lines shall be tested under a gage pressure of seventy-five (75) psi. The pressure in the lateral lines shall be maintained for a period of not less than one (1) hour.

Any leaks which develop within the times specified shall be repaired and all defective materials replaced to the satisfaction of the Engineer. The test shall be repeated and system repairs made until there are no leaks within the prescribed time limits. The tests shall be observed and approved by the Engineer prior to placing any final backfill.

30-13.01 Sprinkler Coverage Test

Upon approval of the lateral line tests, the sprinkler heads shall be installed and tested for appropriate coverage. Any leaks within the sprinkler head assembly shall be repaired and all defective materials replaced to the satisfaction of the Engineer. All sprinkler heads, rotors and spray heads shall be adjusted so the water spray is properly applied to the turf areas and so it does not contact structures, such as fences, walls or buildings or roadways, walkways, sidewalks, or other non-landscaped areas.

When the irrigation system is completed, the Contractor in the presence of the District Inspector and Design Engineer shall perform a coverage test of water afforded in the planting areas. The Contractor shall furnish all materials and labor required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Design Engineer of any deviation from the plan required due to wind, planting, soil, or site conditions, that bear on proper coverage. If such corrections or additions are required in the sprinkler system, the Contractor shall make all adjustments and corrections without any extra cost to the District.

For sites not yet graded to finish grade, sprinkler heads shall be installed to match existing ground for testing. Where designated by the Engineer, after testing is complete, the Contractor shall adjust sprinkler heads to finished ground in turf areas and one half (1/2) inch above finished ground in planter areas.

30-14 System Operations Test

After installation of the automatic controller, valves and sprinkler heads, the complete Irrigation System shall be operated. Any defective or inoperative material shall be repaired or replaced to the satisfaction of the Engineer. The Contractor shall balance and adjust the various components of the Irrigation System so the overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to part circle sprinkler heads, and individual station adjustments on the controllers.

30-15 As-Built Drawings

The Contractor shall provide and keep up to date a complete set of as-built drawings, which shall be corrected daily to show changes in sprinkler locations, controller locations, pump locations, piping locations, and other deviations from the original Project Plans as provided to the Contractor. All isolated manual and automatic control valve locations shall be shown with actual

measurements to reference points so they may be located easily in the field. Upon completion of the Work, the Contractor shall furnish the Engineer with a complete set of As-Built drawings showing the sprinkler system as installed. The cost for providing As-built Drawings shall be included in the lump sum price bid for the Irrigation System, and no additional payment will be made therefor.

30-16 Operations and Maintenance Manual

The Contractor shall prepare and deliver to the Engineer, prior to final acceptance of the Work, all required and necessary descriptive material in complete detail in two individually bound sets of an Operations and Maintenance Manual. Each Manual shall contain as a minimum a description of the material and equipment installed and shall be in sufficient detail to permit operating personnel to understand, operate and maintain all equipment. Each Manual shall contain, as a minimum, the following:

- a. Index sheet stating the Contractor's address and telephone number, duration of guarantee period.
- b. List of equipment, with names and addresses of local manufacturers' representatives, including spare parts lists and related manufacturer identification for each installed equipment item, and manufacturers' literature and specifications of equipment or material installed.
- c. Contractor's Certificate of Construction Compliance, which indicates that all Work done, materials and equipment used and installed are in compliance with the Plans, Special Provisions, these Specifications, and any revisions thereto.
- d. Complete operating instructions for all major equipment.
- e. Initial electrical reference data for all Automatic Control Valves installed. The following data shall be provided:
 1. Ohmmeter reading at the controller and each Automatic Control Valve.
 2. Voltmeter reading at each Automatic Control Valve.

The cost for providing Operations and Maintenance Manuals shall be included in the lump sum price bid for the Irrigation System, and no additional payment will be made therefor.

30-17 System Guarantee

Reference is made to Section 6-9, "Guarantee of Materials and Workmanship". The entire Irrigation System shall be guaranteed by the Contractor to give satisfactory service and to the quality of materials equipment and workmanship, including settling of backfilled areas below finish grade, for a period of one (1) year following the date of final acceptance of all of the Work by the District.

If, within one (1) year from the date of completion and final acceptance of all of the Work, any trouble develops resulting from inferior or faulty materials or workmanship or settlement occurs and adjustments in pipes, valves, and heads, sod, or paving to the proper level of the permanent grades, the Contractor, as part of the Work under the Contract, shall make all adjustments and corrections without cost to the District, including the complete restoration of all damaged planting, paving, or other improvements of any kind.

The District reserves the right to make temporary repairs as necessary to keep the Irrigation System equipment in operating condition. The exercise of this right by the District shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.

Should any operational difficulties in connection with the Irrigation System develop within the specified guarantee period which, in the opinion of the District, may be due to inferior material and/or workmanship, said difficulties shall be immediately corrected by the Contractor to the satisfaction of the District at no additional cost to the District, including any and all other damage caused by such defects.

30-18 Measurement and Payment

Irrigation Systems shall be measured and paid for on a lump sum basis, unless otherwise provided in the Special Provisions. The lump sum or other price paid for the Irrigation System shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the Work involved in constructing and installing the Irrigation System, complete in place, including any necessary accessories required for a complete working system, clearing and grubbing and grading where no bid item is provided therefor, and a Booster Pump and/or Recycled Water Pump where no bid item is provided therefor, all in conformance with the Plans, Special Provisions, these Specifications, and any and all permits issued for the Work.

SECTION 31 – LANDSCAPE PLANTING (TURF AND TREES)**31-1 General**

This Work shall consist of providing all labor, materials, tools, equipment, seeds, plants, and all incidentals and services necessary to complete in all respects Landscape Planting as shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer. The Work shall include, but not be limited to, site clearing and grading, irrigation system testing, soil preparation, weed killing, furnishing and transporting trees and other landscape materials to the site, furnishing grass seed, fertilizer, and other materials, bore and prepare tree planting holes, plant turf, trees and shrubs, provide maintenance of all planted materials during a sixty (60) day plant establishment period for all planted landscaping, clean-up of the site, and all incidentals in the performance of all Work.

The Work to be performed for Landscape Planting shall be done only by a Contractor appropriately licensed for the Work. The Contractor shall utilize skilled workmen who are thoroughly trained and experienced in landscaping and who are completely familiar with specified requirements and methods needed for proper performance of the Work in this Section 31. The Contractor shall provide adequate supervision by a qualified foreman.

Wherever the term “approved” is used in relation to a product or process in this Section 31, in addition to the definition given in Section 1-5, “Approved”, it shall mean a product or process is to be approved by the Engineer prior to its application to the Work.

Reference is made to Section 7-10, “Permits, Licenses, and Fees”. All Work called for on the Plans, specified in the Special Provisions, shown in any detail drawings, or specified in these Specifications, shall be executed in accordance with all governing ordinances, laws and regulations. Any changes and/or additions in the Work necessary to meet the conditions of permits, ordinances, laws, regulations will be made by the Contractor without additional expense to the District, but such changes shall have the prior written approval of the Engineer.

Contracts for Landscape Planting will typically be awarded during weather seasons conducive to such operations. It shall be the Contractor’s responsibility to proceed and complete the landscape work as efficiently and as rapidly as possible, working within the seasonal limitations for each kind of landscape work required. The Contractor’s attention is directed to Section 8-10, “Temporary Suspension of the Work”, Section 8-11, “Time of Completion”, and Section 8-12, “Liquidated Damages” as they pertain to unfavorable weather conditions or delays caused by the Contractor’s operations. Planting operations shall not occur under unfavorable weather conditions, and the applicable portions of these sections will be applied by the Engineer.

The Contractor shall continuously maintain all areas included in the Contract during the progress of the Work, through the establishment period, and until final acceptance of the Work. Reference is made to Section 31-10 “Initial Clean-up”, and Section 31-11, “Maintenance Period and Final Clean-up”.

31-2 Plant Availability

The Contractor shall confirm availability of plants, supplies, and materials shown on the Plans or specified in the Special Provisions for Landscape Planting prior to submitting its bid. If the total available quantity differs from the total on the plant list shown on the Plans or included in the Special Provisions, the Contractor shall notify the District before the bid date. If confirmed, the District shall then select a reasonable alternate and shall inform all those bidding by a Contract Addendum of the non-availability of the original plant and the selected alternate. The selected alternate shall be furnished in the same size, value and quality as the original specified plant. Failure to inform the District of unavailable plants prior to bidding will result in a determination by the District that all plants listed and specified will be provided by the Contractor at the time of installation.

31-3 Site Conditions

Reference is made to Section 2-4, "Examination of Plans, Specifications, Special Provisions, Contract Documents, and Site Conditions", and Section 2-5, "Pre-bid Tests". Prior to submitting a bid, the Contractor shall have visited the site and conducted any tests deemed necessary to fully inform itself of conditions to be encountered during the progress of the Work.

Prior to submitting a bid, the Contractor shall also determine whether the Contractor which installed the Landscape Irrigation System, if not the same Contractor, performed clearing and grubbing and site grading. If clearing and grubbing or site grading was not performed by a previous Contractor, the Contractor shall include this Work in its bid. Reference is made to Section 31-5, "Grading."

No additional payment will be made due to soil or other conditions or other Work performed differing from those anticipated by the Contractor.

31-4 Materials

All plant materials shall conform to the requirements of the Agricultural Code of the State of California, these Specifications, and the Special Provisions. All plant material shall be subject to inspection at the place of growth as well as upon delivery. Initial approval of plant materials by the Engineer shall not limit the right of rejection during progress of the Work for conditions not existing or observed at the time of initial inspection or resulting from improper handling, storage, or other causes.

31-4.01 Materials List

Within fourteen (14) days after award of the Contract, the Contractor shall submit to the Engineer six (6) copies of the following:

- a. A complete materials list of all items proposed to be furnished.
- b. Certificates of Inspection as may be required by government agencies.

31-4.02 Soil Amendment

Soil Amendment shall consist of either of the following:

- a. Nitrolized redwood humus (not shredded or chipped material) conforming to the following:

1. Derivative material - Redwood
2. Particle size - 0" by 3"
3. Organic matter content - rated high by weight percent
4. Reaction - neutral
5. Nitrogen fortified - .05% minimum
6. Salinity - low

b. Imported Topsoil obtained in compliance with the following:

1. Obtain representative samples of the Topsoil proposed for use in the Work and submit them to a certified Soils Testing Lab for a Soil Chemical Analysis and Percent Organic Analysis.
2. Obtain a Soil Amendment Recommendation from a Certified Crop Advisor based on the test results from the analysis performed by the Soils Lab.
3. Submit the recommendation from the Crop Advisor to the Engineer for approval.

The Engineer reserves the right to accept or reject any proposed topsoil.

31-4.03 Fertilizer

Fertilizer shall consist of the following:

a. Trees and Shrubs

Fertilizer for all trees and shrubs shall be GROMAX transplant fertilizer, GROMAX Starter Paks (20-10-5) as manufactured by GROMAX, 229 Pajaro Street, Suite 301 Salinas, California 93901 (1-800-745-1494). Any proposed substitution shall be approved by the Engineer in advance.

b. Turf

The commercial fertilizer for turf shall be a homogenous pellet in the form of fertilizer consisting of ammoniac nitrogen, phosphate, potassium (potash), sulfur, and minor elements. Commercial fertilizer to be similar to Best Triple Twelve (12-12-12), as follows:

Ammoniac Nitrogen	12.00%	Sulfur	15.00%
Available Phosphoric Acid	12.00%	Calcium	2.10%
Soluble Potash	12.00%		

31-4.04 Superphosphate

Superphosphate, commercial fertilizer shall be similar to Best Single Superphosphate (0-20-0).

31-4.05 Gypsum

AG-GYP material shall conform to industry standards and be similar to Ben Franklin No. 1 agricultural gypsum or approved equal.

31-4.06 Mulch (Tree and Shrub Basins)

Mulch to be used in tree and shrub basins shall be Nitrolized redwood humus (not a shredded or shipped material) as described in Section 31-4.02(A).

31-4.07 Staking Material

Stakes and ties shall be furnished in compliance with the following:

- a. Wood stakes shall be pressure treated two inch (2") diameter lodge pole field stake, length as shown on the Standard Plan for Tree Planting Well or as shown on the Plans.
- b. Metal stakes shall be 8'-0" metal T-bar field fence stake (1.33 lb./ft.), painted green.
- c. Ties shall be Wonder Tree Ties, V.I.T. Tree Ties, Worldwide Tree Ties, or approved equal.

31-4.08 Plants

Plants to be utilized in the Work shall be typical of their species and variety, shall have normal growth habits, well developed branches and be densely foliated, and shall have fibrous root systems. Plants shall be free from defects and injuries including disease, insects, insect eggs and larvae and girdled roots. No substitutions will be allowed unless approved in writing by the Engineer.

The quality and size of plants, spread or roots, and size of balls shall be in accordance with ANSI Z60.1-1969, "American Standard for Nursery Stock".

Plant material must be selected from nurseries that have been inspected by State or Federal Agencies. Plants shall be nursery grown and shall have been transplanted or root pruned at least once in the past three (3) years. Plants shall have been grown under climatic conditions similar to those in the locality of the project.

Each bundle of plants shall be properly identified by weatherproof labels securely attached thereto before delivery to the project site. Label shall identify plant by name. Nomenclature shall be in accordance with Hortus III.

No plants shall be delivered to the project site, except for required samples, until inspection has been made in the field or at the nursery, or unless specifically authorized in writing by the Engineer. Plants shall not be pruned before planting.

Collected plant material may be used only when approved. Approval shall not limit the right of rejection by the Engineer during the progress of the Work for conditions of the root ball, latent defects or injuries.

Where shown as "MULTI" on the Plans, provide trees with branching starting close to the ground in the manner of a shrub.

Plants listed on the planting plan shown on the Plans are the minimum acceptable sizes. The quantities listed are the Engineer's estimate only. The Landscape Contractor is responsible for those quantities shown on the Plans.

31-4.09 Tree Trunk Protector

Tree trunk protectors shall be Arbor Guard Polyethylene Guard or approved equal.

31-4.10 Turf Seed

The grass variety to be planted shall be a mixture of seed as follows:

Fifty (50) percent by weight of hulled common Bermuda Grass (*Cynodon Dactylon*);

Twenty-five (25) percent by weight of Medalist America's "Medalist Gold" perennial Rye Grass;

Twenty-five (25) percent by weight of Medalist America's "Triple A" fine Fescue blends.

31-4.11 Other Materials

Materials not specifically indicated, but necessary for proper execution of the Work, shall be of first quality as selected by the Contractor subject to approval of the Engineer. All packaged materials shall be delivered in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site.

31-5 Grading

Before Soil Preparation is to begin, the entire area that is to receive Landscape Planting shall be cleared and grubbed in accordance with the applicable provisions of Section 10, "Underground Utilities", and Section 13, "Clearing and Grubbing". Reference is also made to Section 31-3, "Site Conditions", which requires the Contractor to determine whether the site has already been cleared and grubbed by a previous project. Prior to Grading operations, all woody plant material not removed by Clearing and Grubbing, including any shrubs, vines, weeds, or any unwanted growth, shall be removed. In either case, the site shall then be graded to lines and grades as shown on the Plans. Where no lines or grades for grading are shown on the Plans or specified in the Special Provisions, the site shall be brought to a smooth and even condition as directed by the Engineer. Filled areas shall be sufficiently compacted to prevent settlement when watered. Where insufficient material exists for filling low areas, the Contractor shall import material in conformance with Section 15-2.02, "Imported Material", except that unless otherwise specified in the Special Provisions, furnishing imported material and grading shall be included in the lump sum price paid for Landscape Planting, and no additional payment will be made therefor.

31-6 Preliminary Irrigation System Testing

If the site will be irrigated by a system installed by others in advance of the project to provide Landscape Planting, prior to preparing soil for planting, the Contractor shall operate the Irrigation System to assure that all areas to receive planting have an adequate water supply, and that all irrigation timers are operating properly. All deficiencies shall be brought to the attention of the Engineer, and all corrections shall be made by the Contractor before commencing soil

preparation. The Work involved in making such corrections will be paid for as Extra Work in accordance with Section 4-4, "Extra Work" and Section 9-5, "Payment for Extra Work". If the Landscape Planting project includes the installation of the Irrigation System, the Contractor shall be responsible to assure an adequate water supply to all areas to receive planting and that all timers are functioning properly as part of the cost of furnishing the Irrigation System.

31-7 Soil Preparation

Prior to beginning planting operations, the soil to receive planting shall be prepared in accordance with the following provisions.

All objectionable material shall be removed from all areas to receive turf and plant material in accordance with Section 30-5, "Grading". The Contractor shall rip and cultivate all soil areas so the soil is loose and friable. Fine grading and ripping shall be performed by the Contractor prior to incorporating soil amendments. Ripping shall be done to a depth of eight (8) inches. The soil shall be cleared of all concrete stones, roots and similar objects larger than one inch (1") in length or diameter, and all wire, sticks, and foreign material. The Contractor shall perform such additional hand work as necessary to produce a proper base for the Work of this Section 31-7, including tilling and smooth grading.

31-7.01 Soil Conditioning

After Soil Preparation has been completed, all soil to receive turf and plant material shall be conditioned in accordance with the following provisions.

Materials in the quantities shown shall be applied to the prepared soil:

- a. Soil Amendment complying with Section 31-4.02(A) at twenty (20) cubic yards per acre;
or,
- b. Topsoil complying with Section 31-4.02(B) at a three (3) inch layer over the site.
- c. Soil Amendment or Topsoil shall be applied only when required by the Project Plans or Special Provisions.
- d. Superphosphate complying with Section 31-4.04 at five (5) pounds per 1000 sq.ft.
- e. Slow Release Fertilizer complying with Section 31-4.03(B) at eight (8) pounds per 1000 sq.ft.
- f. Gypsum complying with Section 31-4.05 at 200 pounds per 1000 sq.ft. Gypsum shall be dry, finely pulverized and free-flowing for application through broadcasters or other applicators. Gypsum shall be applied only when required by the Project Plans or Special Provisions.

Following application of the soil conditioners, the soil shall be cultivated to a depth of six (6) inches to provide a homogenous mixture of soil and conditioners. Soil Preparation shall then be completed by finish grading all areas to receive turf and plant material to a smooth and even

surface and slope to match existing finished ground grades. Normally, finish grades shall be flush for turf areas.

31-8 Tree and Shrub Planting

Planting material delivered to the site of the Work shall be provided with adequate protection of root systems and balls from drying winds and sun. Trees shall not be bent or bound in such a manner as to damage bark, or break or destroy the natural shape. The Contractor shall provide protective covering during delivery.

Trees shall be delivered to the Work site only after preparations for planting has been completed, and plant immediately. If planting is delayed more than six (6) hours after delivery, trees shall be set in shade, protected from weather and mechanical damage, and roots kept moist. Container-grown stock shall not be removed from containers until planting time.

All planting areas shall be smooth and even, prepared in accordance with Section 31-7, "Soil Preparation", and finish grades prepared prior to placement of any plants.

The Contractor shall place all trees and shrubs in locations shown on the Project Plans. The tree and shrub lay-out shall be approved by the Engineer before planting or digging planting holes. The Engineer shall be informed two (2) days prior to placing the plants and digging holes.

31-8.01 Tree/Shrub Planting Holes

After plant locations are approved by the Engineer, the Contractor shall excavate holes of circular outline with vertical sides for all plants. The vertical sides and bottom of the holes shall be thoroughly scarified to promote union of backfill with existing soils.

Holes for planting trees and shrubs shall be excavated in accordance with the applicable Standard Plan therefor. Where impervious material is encountered in the holes, a twenty-four (24) inch diameter hole shall be augured for trees, and a twelve (12) inch diameter hole shall be augured for shrubs, to a depth sufficient to reach pervious material, or to such other depth determined by the Engineer, and backfilled with sandy soil. Smooth sides on the holes shall be roughened. The Contractor shall test plant holes for drainage by flooding with water. If the water does not drain out within two (2) hours, additional excavation shall be carried down as required to achieve such drainage by breaking through the impervious layer.

After all planting holes have been prepared, the Contractor shall carefully remove each plant from its container without damage to the root system. Set each plant in the center of the planting hole, plumb and straight and in accordance with the applicable Standard Plan therefor. Set the crown of the plant at one (1) inch above finish grade (after settling).

When one-half ($\frac{1}{2}$) of the backfill mix has been placed, tamp-in, insert fertilizer as specified in Section 31-8.01.1. Allow no air pockets as the remainder of backfill is added. Compact soil around the rootball of all plants.

Berms around trees and shrubs shall be constructed in accordance with the applicable Standard Plan and the plant shall be watered thoroughly. Mulch complying with Section 31-4.06 shall be applied to each bermed planting hole as shown on said Standard Plans.

Excess soil from plant holes shall be cultivated and raked to a smooth outline.

31-8.01.1 Plant Fertilizing

Plant fertilizer complying with Section 31-4.03(A) shall be applied in the following amounts:

1 Gallon Can	-	1 Gro-Pak
5 Gallon Can	-	5 Gro-Paks
15 Gallon Can	-	10 Gro-Paks
24 Inch Box	-	18 Gro-Paks

31-8.02 Pruning

All trees and shrubs shall be pruned in accordance with established horticultural practice. Shearing of any plants will not be acceptable.

31-8.03 Tree Staking

Trees shall be supported by tree stakes complying with Section 31-4.07(A), and installed in accordance with the applicable Standard Plan for tree planting.

Trees shall be tied to stakes loosely with ties complying with Section 31-4.07(C), installed in accordance with said Standard Plan.

31-8.04 Pre-Emergent Application

Upon completion of planting that is located in open areas not to be turfed, the Contractor shall treat such open areas with an approved pre-emergent at a rate recommended by the treatment manufacturer. The Contractor shall coordinate application with the Engineer and provide a certificate of application. The Contractor shall provide one final application of pre-emergent seven (7) days prior to final acceptance of the Work. The cost for applying pre-emergent shall be included in the cost of furnishing landscape planting material, and no additional payment will be made therefor.

31-9 Turf Planting

The planting of turf may be accomplished by sowing seed or by hydromulching in accordance with the following provisions.

31-9.01 Sowing Seed

The grass variety to be planted shall be a mixture of seed as specified in Section 31-4.10, "Turf Seed". All seed shall be delivered to the site of the Work in sealed containers with the vendor's tag of certification attached to each container. These shall remain attached to the containers and no seed shall be planted until each tag has been signed and approved by the Engineer, after which seed may be planted. The date on the certification tag shall be within five (5) months of the proposed planting date.

The Engineer reserves the right to take samples from each container for testing to verify certification and conformance with the California State Seed Law and Regulations. Seeds shall also meet the following minimum quality standards:

Hulled Bermuda grass - testing 98% purity minimum, 85% germination minimum and 0.25% maximum weeds.

The above percentages do not include crop seed, inert matter, etc. All seed shall be delivered to the site of the Work in sealed containers with the vendor's tag of certification attached to each container. These shall remain attached to the containers and no seed shall be planted except in the presence of the Engineer. The Engineer reserves the right to take samples from each container for testing to verify certification and conformance with the California State Seed Law and Regulations.

The minimum application rate to be used by the Contractor for sowing seed shall be five (5) pounds per 1000 square feet of area to receive Turf Planting.

Just prior to sowing the seed, the surface of the area to be planted shall be sufficiently loose and friable to receive the seed. The lawn shall be sown evenly at the minimum rate specified in this Section 31-9.01. During the sowing, care should be exercised to keep the seed mixture uniform avoiding uneven distribution of varieties.

Immediately after seeding, all areas shall be rolled with a "Til-in-Pak" or "Viking" type roller.

31-9.01.1 Fertilizing After Seeding .

The Contractor shall apply fertilizer complying with Section 31-4.03(B) to the lawn area at the time of planting and every two weeks thereafter, at the rate of eight (8) pounds per one thousand (1,000) square feet of turf. The Contractor shall continue with the fertilizer application until the planted turf area is accepted unless otherwise specified in the Special Provisions or directed by the Engineer.

31-9.02 Hydromulching

Hydromulching shall consist of the mixture of a prepared wood mulch, grass seed, water, mulch binder and fertilizer sprayed through a hose onto a prepared seed bed. Site preparation for Hydromulching shall comply with Section 31-7, "Soil Preparation". Seed applied through Hydromulching shall comply with Section 31-4.10, "Turf Seed". Preparation and application of Hydromulch shall comply with the following requirements.

31-9.02.1 Mix Preparation

Hydraulic equipment used for the application of the fertilizer, seed, and slurry of prepared wood mulch shall be of the "Super Hydroseeded" type. The equipment shall have a built-in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry.

The slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will provide a continuous non-

fluctuating discharge. The slurry tank shall have a minimum capacity of one thousand (1,000) gallons and shall be mounted on a traveling unit, either self-propelled or drawn by a separate unit, which will place the slurry tank and spray nozzle within sufficient proximity to the areas to be seeded.

The slurry preparation shall take place at the site of Work and shall begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, good recirculation shall be established and at this time the seed shall be added. Fertilizer shall then be added to the mixture after the seed and when the tank is at least one-third filled with water. The seed shall be of quality and mixture as previously specified.

The engine throttle shall be opened to full speed when the tank is half filled with water. All the wood pulp mulch shall be added by the time the tank is two-thirds ($\frac{2}{3}$) to three-fourths ($\frac{3}{4}$) full. Spraying shall commence immediately when the tank is full.

31-9.02.2 Application Rate

The application rate for areas to receive Hydromulching shall be as follows:

Wood Mulch:	40 lbs./1,000 sq. ft.
Fertilizer, Long Lasting (14-7-3):	20 lbs./1,000 sq. ft.
Seed Mixture:	7 lbs./1,000 sq. ft.
Mulch Binder (Mulch Tackifier):	2 lbs./1,000 sq. ft.

31-9.03 Watering

After sowing seed or hydroseeding, the seed beds shall be kept continually moist. The time interval between "water off" and during "water on" irrigation is governed strictly by the amount of surface moisture. This means simply that the mulch and seeds should be kept damp at all times and irrigation should be adjusted accordingly. Each watering period should be regulated to just dampen the mulch and seed without creating runoff. The only moisture a seed receives during initial germination is the moisture that soaks directly into the seed itself. Once the process of germination begins and before a life sustaining root is thrust into the earth, the seed is dependent on absorbing surface moisture alone. This is the critical germination period and during this period if the seed dries out it will die and be lost. When germination has progressed to the point where a root is thrust into the earth then the life sustaining moisture is picked up by the root and frequent irrigation is not as critical. Therefore, it is the responsibility of the Contractor to monitor the site conditions so it is able to alter the watering times and frequencies to keep the seeded areas moist.

The Contractor shall apply water by means of a gentle spray to make all seeded areas moist, but not flooded. Care shall be taken to avoid watering to the extent of saturating the soil and causing "flotation" or "flowing" of the top surface of the soil. After water has once been applied, no portion of the planted areas shall be allowed to dry out during the entire maintenance period. The Contractor shall be responsible to monitor the site and alter the watering times and frequencies to meet site conditions.

31-10 Initial Clean-up

After all planting operations have been completed, and prior to initiation of the Maintenance Period, the Contractor shall perform an Initial Clean-up. All trash, excess soil, empty containers or any other debris accumulated by the Work shall be removed from the site. All damage caused by the Work shall be repaired at the Contractor's expense and the ground shall be brought to a neat and orderly condition to the satisfaction of the Engineer. All reasonable precautions shall be taken to avoid damage to existing planting and structures. All planting areas shall be free of weeds and neatly cultivated. Plant basins shall be top-dressed with mulch and in good repair.

A general inspection will be held upon conclusion of Initial Clean-up. The Engineer shall be informed in writing a minimum of two (2) working days prior to the time the Work is ready for inspection in order to arrange a suitable time and date for such inspection.

Work requiring corrective action or replacement in the judgment of the Engineer shall be performed within five (5) days after the inspection. Corrective work and material replacement shall be in accordance with the Plans, Special Provisions, and these Specifications, and shall be made by the Contractor at no cost to the District. A subsequent inspection shall then be arranged.

If, after the inspection, the Engineer is of the opinion that all the Work has been performed in accordance with the Plans, Special Provisions, and these Specifications, the Contractor will be given written notice that the Maintenance Period as specified in Section 31-11, "Maintenance Period and Final Clean-up" shall be initiated.

31-11 Maintenance Period and Final Clean-up

After all Work shown on the Plans, specified in the Special Provisions and these Specifications, and directed by the Engineer has been completed, inspected, and approved by the Engineer, and upon written notification by the Engineer, as provided in Section 31-10, "Initial Clean-up", the Contractor shall immediately commence a sixty (60) calendar day plant establishment period - the "Maintenance Period".

Maintenance is herein defined as being all work normally necessary to germinate planted seeds and grow a healthy, uniform turf of smooth and even texture and grade, and that all trees, shrubs and turf areas shall be kept at optimum growing conditions by watering, weeding, replanting turf as necessary, fertilizing, cultivating, spraying for weeds, diseases and insects, replace dead or dying trees or shrubs, and providing any other reasonable operations of maintenance and protection required for successful completion of the Work.

The first turf mowing shall not commence until the grass is generally at least one (1) inch in height. For the first mowing and all subsequent mowings, the mower shall be set to cut at a height of five-eighths ($\frac{5}{8}$) inch. The lawn shall be maintained by mowing and edging at least once every fourteen (14) calendar days after the initial mowing. The Contractor shall mow the site a minimum of four times. The lawn shall be mowed and edged prior to final inspection. Only a reel type mower shall be used to perform all mowing at the site.

The Contractor shall apply the turf fertilizer specified in Section 31-4.03(B) to the planted turf area every two (2) weeks. The application rate for the fertilizer shall be as specified in Section 31-9.01.1, "Fertilizing After Seeding". The Contractor shall continue with the fertilizer application until the planted turf area is accepted.

Between the fifteenth (15th) day and the twentieth (20th) day of the Maintenance Period, the Contractor shall replant the spots or areas in which normal germination of the Bermuda grass seeds are not evident. The Contractor shall, throughout the area planted for turf, remove all rocks or other debris that would constitute a hindrance to mowing; repair all damage done by his operations; fill all depressions and eroded channels with sufficient top soil to raise to proper grade, compact lightly, and replant the filled areas; and roll all planted and replanted areas with a one hundred twenty-five (125) pound weight roller to compact the soil around the grass roots and to provide a smooth and even mowing surface.

Weeding of the entire site shall be conducted continuously throughout the Maintenance Period.

If, during the Maintenance Period, the Engineer determines that the Contractor is not diligently performing proper maintenance, the District may take any actions permitted by these Specifications to assure the Work is prosecuted in the manner required to protect and foster the growth of all planted material.

At the end of the sixty (60) day Maintenance Period, an inspection of the turf, trees, and shrubs shall be made by the Engineer in the presence of the Contractor to determine if the planted turf areas are well established and healthy throughout the entire planted areas and that all trees and shrubs are in a healthy and growing condition. If any portion or all of the turf areas are determined by the Engineer as being unacceptable, the Maintenance Period will be extended to such time as the turf areas are brought up to the acceptable level. For any trees or shrubs showing distress or other unfavorable conditions, actions shall be taken by the Contractor to correct such conditions, including, but not limited to, replacement of any or all of such plants, all at the Contractor's expense. In this case, the Maintenance Period may be extended at the discretion of the Engineer.

An inspection will be made by the Engineer at the end of the Maintenance Period, as may be extended. If in the opinion of the Engineer the Work is complete and acceptable in all respects, including site clean-up, the inspection shall be deemed final, and the Engineer will accept the Work and provide the Contractor written notice thereof.

If during the inspection, deficiencies have not been corrected by the end of the stated Maintenance Period, the Contractor shall continue to maintain the project at his own expense beyond the specified Contract Time of Completion until all deficiencies are corrected. When all deficiencies have been corrected, a final inspection will be conducted and the Work will be accepted by the Engineer as above provided.

For any Work beyond the Time of Completion as specified in the Special Provisions, the Contractor's attention is directed to Section 8-11, "Time of Completion", and Section 8-12, "Liquidated Damages".

31-12 Measurement and Payment

Landscape Planting shall be measured on a lump sum basis unless otherwise provided in the Special Provisions. The lump sum or other specified price paid for Landscape Planting shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all Work involved including, but not limited to, grading, soil preparation, turf planting, planting of trees and shrubs, watering, fertilizing, and satisfactory completion of the Maintenance Period and final clean-up, all as shown on the Plans, as specified in the Special Provisions and these Specifications, and as directed by the Engineer.

SECTION 32 - PAINTING**32-1 General**

This Work shall include furnishing all labor, materials, tools and equipment and all incidentals necessary to paint exposed metal surfaces where shown on the Plans or specified in the Special Provisions. Unless otherwise specified in other sections of these Specifications or the Special Provisions, Painting shall conform to the provisions of this Section 32.

32-2 Materials

Materials shall conform to the following specifications:

32-2.01 Metal Etch

Only an approved etching chemical shall be used by the Contractor for cleaning metal surfaces prior to priming or painting. The Contractor shall observe all State and Federal regulations pertaining to use of such chemicals.

32-2.02 Metal Primer

Metal Primer shall be a professional quality interior/exterior rust preventative alkyd primer suitable for the protection of metal surfaces. The Metal Primer shall be similar in all respects to Devco Coatings Devgard 4141-7100 (oil base, red) or approved equal.

32-2.03 Finish Coat

Except for metal parts for Storm Drain Inlets, the Finish Coat or all other surfaces to be painted shall be a premium quality acrylic enamel coating or other coating as approved by the Engineer. The Finish Coat shall be similar to, but not limited to, Devflex HP paint or approved equal. The Finish Coat color shall be black unless otherwise shown on the Plans, specified in the Special Provisions, or approved by the Engineer. Unless otherwise specified, the sheen shall be "eggshell" or semi-gloss. The coating for Storm Drain Inlet/Outlet metal parts shall be an approved asphaltum black paint, or such other coating as may be approved by the Engineer.

32-3 Application

All surfaces to be painted shall be thoroughly cleaned of all foreign matter before applying the protective coating. All surfaces shall be free from loose existing protective coatings before applying an additional coating. Metal etch shall be used as necessary to remove deleterious coatings and provide a good bonding surface for primer and paint.

If galvanized surfaces are to be painted, they shall be considered as metal surfaces without a protective coating, and shall be etched with metal etch before applying paint.

After cleaning preparations, surfaces not having a protective coating shall be painted with metal primer at the approximate rate of five hundred (500) square feet per gallon of primer, equivalent to three-to-four (3 to 4) mils wet-film thickness.

Those surfaces having a protective coating of less than three (3) mils film thickness shall be painted with metal primer to provide a minimum of three (3) mils film thickness.

All surfaces to be painted shall have a Finish Coat applied at the approximate rate of five hundred fifty (550) square feet per gallon of paint equivalent to three-to-four (3 to 4) mils wet film thickness.

32-4 Payment

Unless otherwise specified in the Special Provisions, the cost of Painting shall be included in the price paid for the various items requiring Painting, and no additional payment will be made therefor.

SECTION 33 - MISCELLANEOUS FACILITIES AND OPERATIONS**33-1 General**

This Work shall consist of furnishing all labor, materials, tools and equipment, and all incidentals necessary to furnish, install, and construct Miscellaneous Facilities and Operations, which shall include, but not be limited to, installing, constructing, providing, or performing all Work or operations shown on the Plans or specified in the Special Provisions, or doing Work patently necessary for the completion of the Work specified in the Contract.

Miscellaneous Facilities and Operations may include such things as, but not be limited to, the following:

Mobilization; potholing; clearing and grubbing; dewatering existing facilities; minor grading; dust control; traffic control; providing temporary security fences or other security measures for the Work, private or District property; protecting existing utilities and improvements in or near excavations; protection of existing trees or landscaping; and

Removing and replacing existing fences, landscaping, irrigation facilities, mailboxes; abandoning existing storm drain facilities; removal of existing drainage facilities (including existing RCP); removing and disposing of existing facilities; plug or remove, as directed by the Engineer, any abandoned facility encountered in the excavation; and

Salvaging existing facilities; replacing existing concrete improvements; connecting new facilities to existing facilities; connecting new facilities to new facilities; sawcutting and removing/replacing existing asphalt or other improvements not covered under a specific bid item; constructing concrete collars, field connections, or field bends; placing and/or removing concrete or brick and mortar plugs; and

Providing any other facilities and/or operations set forth and required but not specifically included in another bid item.

All Work shall be done in accordance with the Plans and Special Provisions, these Specifications, any applicable local codes and ordinances, any permits issued by the jurisdictional agency, and as directed by the Engineer.

This Section 33 is intended to be inclusive. However, depending on project circumstances, such as size, complexity, or other factors, some Contracts may include a separate bid item for one or more of the above-listed facilities or operations. In such cases, the costs for any such facilities or operations shall be included in the bid item and omitted from any bid item for this Section 33. Relatedly, not all conceivable facilities and operations are listed, but shall be considered as being included in this Section 33.

33-2 Materials

All materials used in furnishing Miscellaneous Facilities and Operations shall conform to the applicable Sections of these Specifications. Any materials used in the Work not covered by these Specifications shall comply with standards referenced on the Plans or in the Special Provisions, the applicable Caltrans Standard Specifications, and/or ASTM Designations for the material involved.

33-3 Performance

All work performed in providing Miscellaneous Facilities and Operations shall conform to the applicable Sections of these Specifications or as otherwise shown on the Plans or specified in the Special Provisions. In all cases, the Contractor shall exercise recognized good and applicable construction practices in the completion of the Work associated with this Section 33. Faulty workmanship as determined by the Engineer will be rejected and shall be removed/replaced by the Contractor at its expense.

33-4 Measurement and Payment

Where a bid item is provided for Miscellaneous Facilities and Operations, measurement and payment shall be on a Lump Sum basis, and shall include full compensation for all costs including labor, materials, tools, and equipment, and all incidentals necessary to complete all of the Work shown on the Plans, specified in the Special Provisions and these Specifications, and as directed by the Engineer.

Unless otherwise specified in the Special Provisions, each Progress Payment period the Engineer shall make a determination of the percentage of completion of the total of all bid items excluding Miscellaneous Facilities and Operations. Said percentage shall be used as the basis for computing the amount to be paid for Miscellaneous Facilities and Operations for each respective Progress Payment. The Engineer may increase or decrease the percentage to be paid based on the demonstrated performance of the Contractor in completing the various components listed in the bid item.

Where no bid item is provided for Miscellaneous Facilities and Operations, the cost thereof shall be included in the various other items of work, and no additional payment will be made therefor.

INDEX OF TERMS

-A-	<u>Page</u>	-B- (Cont'd)	<u>Page</u>
Abbreviations	1-1	Material	15-1
Acceptance	1-2	Outfall Structures	25-2
Acceptance of Contract	8-9	Pre-cast Pipe	15-3
Access	7-15, 8-3	Pump Sump	26-5
Admixtures, Concrete	12-4	Slurry Cement	15-1
Aggregate-Coarse, Concrete	12-2	Storm Drain Inlets and Outlets	24-3
Aggregate-Fine, Concrete	12-2	Structure	15-7
Air Entraining Agent	12-4	Time Limits	8-3
Air Pollution, Contractor's Equip.	7-18	Backflow Prevention Devices	30-7
Alternative Construction Methods	5-5	Bar Reinforcement	11-1
Alternative Pipe, Chain Link Fence	28-2	Barbed Wire	26-8, 28-3
Amendment of Contract	7-1	Bedding, Pipe	15-2, 17-3, 18-4, 19-2
Application, Paint	32-1		21-1, 22-2
Application Rate, Hydromulching	31-10	Best Management Practices	1-2
Application Rate, Seed	31-9	Bid Bond, Return	3-2
Apprentices, Employment of	7-3	Bidder	1-2
Approved	1-2, 31-1	Bidder Disqualification	2-4
Archeological, Cultural,		Bidder's Proposal	1-2
Paleontological Resources	7-13	Content	2-1
As-Built Drawings,		Form	1-2
Irrigation System	30-18	Guaranty (Bid Bond)	1-2
Asphalt Concrete Pvmnt , Permanent	16-1	Relief	2-4
Asphalt Concrete Pvmnt, Temporary	16-1	Board	1-2
Assignment of Contract	8-2	Bonds, Payment, Performance	3-2
Authority of Engineer	5-1	Breakdown of Costs	9-1
Authorized Representative,		Boring and Jacking Pipe	20-3
Contractor's	5-3	Bowl Assembly, Pump	26-1
Automobile Liability Insurance	7-6	Brand and Trade Name Matl's	6-3
Availability, Emergency	5-3		
Award of Contract	1-2, 3-1	-C-	
with Multiple Construction Units	3-1		
	-B-	Calcium Chloride Admixture	12-4
Backfill		Calif. Dept. of Transportation	1-3
Cast-in-Place Pipe	15-3, 19-5	(Caltrans)	
Corrugated Metal Pipe	15-3, 15-5, 21-2	Calif. Manual on Uniform Traffic	1-3
Curb, Gutter, Sidewalk, Valley	27-4	Control Devices (Calif. MUTCD)	
Gutter, Mowstrip		Cast-in-Place Concrete Pipe	19-1
Emergency	15-8	Cement, Portland	12-1
Final Backfill	15-3, 15-6	Cement Mortar	12-6
Initial Backfill (See "Initial Backfill")		Cement Mortar Joints (RCP)	17-2
Jacking and Receiving Pits	20-5	Cement Slurry (see Slurry Cement)	
Manholes	23-2	Certificates of Compliance	6-2
		Chain Link Fence and Gates	28-1

INDEX OF TERMS

-C- (Cont'd)	<u>Page</u>	-C- (Cont'd)	<u>Page</u>
Changes	4-1	Licensing Laws	7-3
City	1-3	Responsibility for Work/Materials	7-9
Claim, Notice of Potential	9-4	Control	
Claims	9-8	of Work	5-1
Clean-up		of Materials	6-1
Initial	8-4, 31-11	Controllers, Irrigation System	30-6
Final	8-5, 31-11	Corrugated Metal Pipe (CMP)	21-1
Clean Water Act	1-3	County	1-3
Clearing and Grubbing	13-1	Cooperation	8-7
Commencement of Work	8-1	Cost Breakdown	9-1
Commercial General Liability Ins.	7-6	Curb and Gutter	27-1
Compaction, Backfill	15-8, 24-3	Curing, Cast-in-Place Pipe	19-4
Compaction Time Limits	8-3	Curing Concrete	12-6
Compensation, Employee Security	7-1	Curved Alignments, Pipe	17-5, 18-6, 22-5
Completion, Time of	8-6		
Compliance Certificates	6-2	-D-	
Compliance w/ Laws & Regulations	7-1	Damage Responsibility, District	7-4
Concrete, Portland Cement	12-1	Damaged Galvanized Material	25-3, 28-5
Concrete, Ready-mixed	12-3	Damages, Liquidated	1-4, 8-6
Concrete Tests, Cast-in-Place Pipe	19-5	Days	1-3
Confined Spaces Entry	7-12	Defective Material	5-5, 6-4
Conflicts, Utilities	10-3	Defense and Indemnification	7-4
Construction Activities Stormwater		Definitions and Terms	1-1
Permit, State	1-5	Delays, Right of Way	8-5
Construction Inspection	5-4	Detour	1-4
Construction Joints – see “Joints”.		Directors, Board of	1-2
Construction Methods, Alternative	5-5	Discharge Structure	26-7
Contractor	1-3	Disorderly, Incompetent Employee	5-6
Contract		Disposal of Materials	7-24, 14-5
Acceptance	8-9	District	1-4
Amendment	7-1	District Engineer	1-4
Assignment	8-2	Disqualification of Bidders	2-4
Definition	1-3	Dust Control	7-17, 8-3
Execution	3-2		
Failure to Execute	3-2	-E-	
Modification	7-1	Easements, Rights of Way,	
Termination	7-1, 8-7	Work Area	7-25
Contractor's		Edge Trimming, Pavement	16-2
Authorized Representative	5-3	Electrical Service	7-24
Bonds (Performance, Payment)	3-2	Electrical Power Supply, Irrig.	30-8, 30-15
Emergency Availability	5-3	Embankment Const.	15-7, 28-4

INDEX OF TERMS

-E- (Cont'd)	<u>Page</u>	-F- (Cont'd)	<u>Page</u>
Emergency Availability, Contractor's	5-3	Finish Coat	
Emergency Backfill	15-8	Ornamental Metal Fence	29-4
Employee Compensation, Security	7-1	Paint	32-1
Employer's Liability, Worker's		Finish, Interior, CIPCP	19-5
Comp. Insurance	7-5	Fittings, PVC Pipe	18-1, 18-2, 30-5
Employment of Apprentices	7-3	Fittings, HDPE Pipe	22-1
Engineer		Floor Grating, Pump Station	26-7
Definition	1-4	Floatation Prevention,	18-4, 21-2, 22-3
Authority of	5-1	Fly Ash Admixture	12-4
Engineer's Estimate		Footings, Fence Posts	28-4, 29-2
Definition	1-4	Foreign Materials	6-3
Of Quantities	2-1	Formal Claims	9-8
Establishment and Maintenance,		Forms, Concrete	12-5
Marks and Stakes	5-4	Frac-Out Contingency Plan	
Examination of Contract Documents	2-1	Jacking Pipe	20-5
Excavation and Trenches,		-G-	
Hazardous Waste	7-13	Galvanized Iron Pipe, Irrig.	30-5
Execution of Contract	3-2	Galvanized Materials, Damaged	25-3, 28-5
Existing Improvements,		Gates, Chain Link	28-3
Protection/Restoration	7-14	Gates, Ornamental Metal Fence	29-3
Expansion Joints, Concrete	27-2	General Liability and Auto Ins.	7-6
Extensions, Fence Post	26-8, 28-3	Grating, Pump Station Slab	26-7
Extra Work		Guarantee of Materials/Workmanship	6-5
Definition	4-1	Guaranty, Bidder's Proposal	1-2
Payment for	9-2	Return of	3-2
-F-		Gypsum	31-3
Fabric, Chain Link Fence	28-1	-H-	
Fabric, Welded Wire	11-1	Hazardous Wastes, Trenches	
Failure to Execute Contract	3-2	And Excavations	7-13
Feasibility, Cast-in-Place Pipe	19-3	HDPE Plastic Pipe	22-1
Fence Enclosure, Pump Station	26-8	Hours of Labor	7-1
Fence Fabric, Chain Link	28-1	Horizontal Rails, Orn. Metal Fence	29-1
Fence Posts, Braces	28-2	Hydromulching	31-9
Fenced Outfall Cages	25-2	Hydrostatic Test, CIPCP	19-6
Fertilizer	31-3	-I-	
Final Backfill	15-6, 17-4, 18-5, 21-2, 22-4	Imported Material	15-1
Final Clean-up	8-5, 31-11		
Final Inspection	5-6		
Final Pay Items	9-2		
Final Payment	9-7		

INDEX OF TERMS

-I- (Cont'd)	<u>Page</u>	-M-	<u>Page</u>
Incompetent/Disorderly Workers	5-6	Maintenance and Operations	
Indemnification and Defense	7-4	Manual, Irrigation System	30-19
Initial Backfill	15-4, 15-5, 17-4, 18-5, 21-2, 22-4	Maintenance Period, Turf	31-11
Initial Clean-up	8-4	Maintaining Drainage	7-19, 14-4, 15-9
Inspection, Video	17-5, 18-7, 22-6	Manholes	23-1
Insurance	7-5	Markings, Traffic	16-5
Intent of Plans and Specifications	4-1	Marks and Stakes, Establish/Maintain	5-4
Interior Finish, CIPCP	19-5	Markouts, Utilities	8-4, 10-1
Interpretation and Precedence of Plans, Standard Specifications, Special Provisions, Other Contract Documents	5-2	Materials Statement, Samples	3-2
Irrigation System Testing	30-17	Measurement and Payment	9-1
Turf	31-8	Metal Etch	32-1
-J-		Metal Primer	32-1
Jacking Pipe	20-1	Min. Cover, Pipe	17-4, 18-5, 21-2, 22-4
Jacking and Boring Pipe	20-3	Misc. Facilities and Operations	33-1
Jacking/Receiving Pits, Excavation	20-2	Miscellaneous Surface Restoration	16-4
-K-		Mobilization	33-1
-L-		Modification of Contract	7-1
Laboratory	1-4	Motor, Pump	26-5
Labor Code	1-4	Mowstrip	27-3
Labor Hours	7-1	Mulch	31-4
Labor Non-Discrimination	7-2	MUTCD, Calif.	1-3
Landscape Planting	31-1	-N-	
Ladder, Sump	26-6	National Pollutant Discharge Elimination System (“NPDES”)	
Lateral	1-4	Definition	1-4
Laws and Regulations, Compliance	7-1	Compliance	7-20
Laying Pipe	17-3, 18-4, 19-3, 21-2, 22-3	Preparation of Permit Registration	7-21
Legal Holidays	1-4	Preparation of SWPPP and CSMP	7-21
Legal Relations and Responsibilities	7-1	SWPPP and CSMP Implement.	7-21
Licenses, Permits, Fees	7-3, 7-11	Preparation and Submittal, Notice of Termination	7-23
Licensing Laws, Contractor’s	7-3	Measurement and Payment	7-23
Lines and Grade, Surveying/Staking	5-3	Native Material	15-1
Liquidated Damages	1-4, 8-6	Non-Discrimination, Labor	7-2
Listing Proposed Subcontractors	2-3	Notice of Potential Claim	9-4
		Notice, Stop	9-5
		Notice to Proceed	5-3
		Notice to Residents	8-1

INDEX OF TERMS

-O-	<u>Page</u>	-P- (Cont'd)	<u>Page</u>
Open Trench, Structure Excavation		Posts and Footings, Ornamental	
Time Limits	8-3	Metal Fence and Gates	29-2
Operations and Maintenance		Pre-Bid Tests	2-2
Manual, Irrig. System	30-19	Precedence, Plans, Specifications	5-2
Operations, Subcontractor's	5-6	Pre-Construction Conference	5-3
Order of Work	5-3	Prevailing Wage; Payroll	7-2
Ornamental Metal Fence and Gates	29-1	Pre-cast Pipe Backfill	15-3
Outfall Structures	25-1	Primer, Metal	32-1
Outfall Cages, Fenced	25-2	Proof of Insurance, Submittal	3-1
		Progress of the Work	8-2
-P-		Progress Payments and Retentions	9-4
Paint Binder (Tack Coat)	16-3	Project	1-5
Painting	32-1	Project Plans	1-5
Pavement	1-4, 16-1	Proposal, Bidder's	1-2
Pavement Removal Limits	16-2	Proposal Form, Content	2-1
Pavement Replacement	16-1	Proposal Guaranty (Bid Bond)	1-2, 2-3
Pavement Trimming, Sawcutting	16-2	Return of	3-2
Payment Bond	3-2	Proposal Requirements and Conditions	2-1
Payment, Final	9-7	Proposed Subcontractors, Listing	2-3
Payment Scope	9-2	Prosecution, Progress of Work,	8-1
Payment for Extra Work	9-2	Protection of	
Payroll, Prevailing Wage	7-2	Archeological, Cultural,	
Performance Bond	3-2	Paleontological Resources	7-13
Performance of Work, True Intent	5-1	Concrete	12-5
Permits, Licenses and Fees	7-3, 7-11, 14-1	Underground Utilities	7-14
	30-2	Existing Improvements	7-14, 13-1
Pesticides, Use of	7-23	Pipe	17-5, 18-6, 19-6, 21-3, 22-5
PG&E Rule 16	26-1, 30-1, 30-15	Protection From	
Pickets, Ornamental Metal fence	29-1	Caving Ground in Excavation	7-11
Pipe Construction Feasibility, CIP	19-3	Toxic and Explosive Gases,	
Pipe Laying	17-3, 18-4, 19-3, 21-2, 22-3	Confined Spaces Entry	7-12
Pipe Min. Cover	17-4, 18-5, 21-2, 22-4	Hazardous Waste	7-13
Pipe Substitutions	17-1, 18-1, 19-1, 22-1	Public Access	7-15, 8-3
Placing Concrete	12-5	Public Convenience and Safety	7-15
Plans and Specifications, Intent of	4-1	Public Contract Code	1-5
Plans and Specifications,		Pump Facilities	26-1
Interpretation, Precedence	5-2	PVC Pipe, Storm Drain	18-1
Plans and Working Drawings	1-5, 5-1	PVC Pipe, Irrigation	30-4
Plant Availability	31-2	Pump Sump	26-5
Portland Cement Concrete	12-1		
Post Extensions, Fence	26-8, 28-3	-Q-	
Posts and Braces, Chain Link Fence	28-2	Quantities, Measurement	9-1
		Quality, Supply of Materials	6-1

INDEX OF TERMS

-R-	<u>Page</u>	-S- (Cont'd)	<u>Page</u>
Rack, Trash	25-3, 26-8	Sawcutting	16-2
Raising Manholes to Grade	23-3	Scope of Work	4-1
Ready-Mix Concrete	12-3	Schedule of Operations	5-3
Regulations & Laws, Compliance	7-1	Scope of Payment	9-2
Reinforced Concrete Pipe (RCP)	17-1	Seal Coat	16-3
Reinforcement, Bar	11-1	Security of Employee Compensation	7-1
Rejected Work, Removal	5-5	Security Lights, Pump Station	26-8
Relief of Bidders	2-4	Seed Application Rate	31-8
Remote Control Telemetry, Irrig.	30-8	Seed, Turf	31-5
Removal		Shop Drawings, Reinforcement	11-1
Defective/Rejected Work	5-5	Sidewalk	27-3
Surfacing	8-2	Slab Flooring, Pump Station	26-7
Representative, Contractor's	5-3	Slump Test, Concrete	12-4
Req'd Listing, Prop. Subcontractors	2-3	Slurry Cement Backfill	15-1, 18-5, 21-2
Responsibility for Damage, Dist.	7-4, 7-9		22-4
Responsibility for Work and		Soil Amendment	31-2
Materials, Contractor	7-9	Soil Preparation, Turf	31-6
Restoration and Protection of		Sound Control Requirements	7-25
Existing Improvements	7-14	Special Provisions	1-5
Restoration of Surfaces	16-1	Specifications	1-5
Restoration of Surfaces, Time Limits	8-3	Sprinkler (Landscape Irrig.) System	30-1
Retention Basin Excavation	14-4	Standard Plans	1-5
Retention Basin Embankment		State	1-5
Construction	15-7	State General Const. Activities	
Retentions, Progress Payments	9-4, 17-6	Storm Water Permit	1-5, 7-20
	18-8, 19-7, 21-3, 22-8	Stop Notices,	
Retention (10%) Substitution	9-4	Right to Withhold Payments	9-5
Return of Proposal Guaranty	3-2	Storage of Materials	6-2
Right of Way Delay	8-5	Storm Drain Inlets and Outlets	24-1
Rights of Way, Easements,		Storm Water Pollution	
Work Areas	7-25	Prevention Plan (SWPPP)	1-5, 7-21
Right to Withhold Payments	9-5	Structure Backfill	15-7
Rubber Gasket Joints	17-2, 18-3, 20-2,	Structure Excavation	14-1
	22-1	Subcontracting	8-1
-S-		Subcontractors, Proposed, Listing	2-3
Safety, Worker	7-10	Subcontractor's Operations	5-6
Salvage of Materials	6-5	Subgrade Preparation, C&G, Sidewalk,	
Samples		Valley Gutter, Mowstrip	27-1
Materials	6-1	Subsistence and Travel	7-2
Tests	6-1	Substitutions, Pipe (see Pipe Substitution)	
Concrete	12-6	Substitution, 10% Retention	9-4
Sanitation Regulations	7-10	Sump Ladder	26-6
		Sump, Pump	26-5

INDEX OF TERMS

-S- (Cont'd)	<u>Page</u>	-T- (Cont'd)	<u>Page</u>
Superphosphate	31-3	Trench and Structure Excavation	14-1,
Supply and Quality of Materials	6-1		17-3, 18-3, 21-1, 22-2
Surface Restoration	16-1, 16-4	Trenches and Excavations,	
Surfacing Removal	8-2	Hazardous Wastes	7-13
Surface Restoration Time Limits	8-3	Trench Widths (Limitations)	18-3, 22-2
Surveying/Staking, Lines and Grade	5-3	Turf Seed	31-5
Suspension of Work, Temporary	8-6		
SWPPP	1-5, 7-21	-U-	
System Operation Test, Irrig.	30-18	Utilities, Underground	
		Definition	1-6
-T-		Conflicts	10-3
Tack Coat (Paint Binder)	16-3	Liability Limits, District	10-3
Telemetry		Markout	8-4, 10-1
Pump Station	26-1	Not shown on Plans	10-1
Irrigation System	30-8	Protection of	7-14, 10-2
Temporary AC Pavement	16-1	Relocation	10-3
Temporary Suspension of Work	8-6		
Termination of Contract	7-1, 8-7	-V-	
Test, Concrete Slump	12-4	Valley Gutters	27-4
Test, CIP Hydrostatic	19-6	Valves, Landscape Irrig.	30-6, 30-13
Tests and Samples	6-1	Vibrators	12-6
Tests, Concrete, CIPCP	19-5	Video Inspection	17-5, 18-7, 22-6
Tests, HDPE Pipe	22-5	Vinyl Coated Fence Fabric	28-1
Tests, PVC Pipe	18-6		
Tests, Pre-Bid	2-2	-W-	
Testing Irrigation System, Turf	31-5	Wall Thickness, Min. CIPCP	19-2
Testing Irrig. System Operations	30-18	Water, Concrete	12-1
Testing, Materials and Work	6-1	Water Pollution Prevention	7-19
Time of Completion	8-6	Water Service	7-24, 30-15
Time Limits		Water, Slump Test	12-4
Compaction	8-3	Water Supply Connection,	
Open Trench, Structure Excav.	8-3	Irrigation System	30-15
Backfill, Trench/Struct. Excav.	8-3	Watering, Turf	31-10
Surface Restoration	8-3	Withdrawal of Proposals	2-4
Surfacing Removal	8-2	Work	
Trade or Brand Name Materials	6-3	Areas, Easements, Rights of Way	7-25
Traffic Control	7-16, 8-3	Commencement of	8-1
Traffic Markings Replacement	16-5	Contractor Responsibility for	7-9
Trash Racks	25-3, 26-8	Control of	5-1
Travel and Subsistence	7-2	Definition	1-6
Trench Backfill, General	15-3	Performance with True Intent	5-1
Trench Backfill, Cast in Place Pipe	15-3		
Trench Backfill, Pre-Cast Pipe	15-3		

INDEX OF TERMS**-W- (Cont'd)**

	<u>Page</u>
Progress	8-2
Removal of Defective/Rejected	5-5
Temporary Suspension	8-6
To Be Done	4-1
Worker Safety, General	7-10
Worker Protection	
From Caving Ground in Excav.	7-11
From Toxic or Explosive Gases; Confined Spaces Entry	7-12
Workers' Compensation Insurance	7-5
Working Day	1-6
Working Drawings, Plans	5-1
Workmanship, Guarantee	6-5

-X-**-Y-****-Z-**

Fresno Metropolitan Flood Control District

Standard Plans

April 1, 2011

Table of Contents

Drawing No.	Title
A	Legends for Construction Drawings
<u>Storm Drain Inlets</u>	
A-1	Type A Inlet / Outlet (Grate Type)
A-2	Type B Inlet / Outlet (For 4½” Wedge Curb)
A-3	Type C Inlet / Outlet (Type D w/ Manhole Cover Lid)
A-4	Type D Inlet / Outlet (Std., For 6” Curb Face)
A-5	Double Type D Inlet
A-6	Type E Inlet (Temporary w/slotted grate)
A-7	Type E Inlet (Temporary w/ curb opening)
A-8	Type F Inlet
A-9	Type G Inlet
<u>Manholes</u>	
B-1	Type A Manhole (Case I thru V)
B-2	Type B Manhole
B-3	Type C Manhole
B-4	Manhole w/ Steps
B-5	Manhole w/ Flat Top Lid Applications
B-6	Low Pressure Manhole
B-7	Manhole Frame and Cover
C-1	Sewer Through Manhole
<u>Outfall Structures</u>	
D-1	Design Tables
D-2	Types A, B, and C Outfalls
D-3	Types D, E, F, and G Outfalls
D-4	Types M, N, O, P, and Q Outfalls
<u>Outfall Fence Cages</u>	
D-5	For Types D, E, and F Outfalls
D-6	For Types G, M, N, O, P, and Q Outfalls
D-7	Modified Fence Cage For Types D, E, and F Outfalls
D-8	Modified Fence Cage For Types G, M, N, O, P, and Q Outfalls
D-9	Type R Temporary Outfall Structure

Chain Link Fence

- E-1 6' Chain Link Fence
- E-2 6' Chain Link Gates
- E-3 Fence Pad Grading, Post and Mowstrip Location
- E-4 Chain Link Fence on Masonry Retaining Wall

Ornamental Metal Fence

- E-5 6' Ornamental Metal Fence
- E-6 6' Ornamental Metal Gates
- E-7 Fence Pad Grading, Post and Mowstrip Location
- E-8 Ornamental Fence Located on Masonry Retaining Wall

Pump Station Facilities

- F-1 Pump Discharge Structure Cover (Expanded Metal)
- F-2 Pump Sump, Control Structure Ladder
- F-3 Pump Station Stilling Well/Water Level Transmitter Installation
- F-4 Pump Station Flood Light Pole and Telemetry System Antenna Pole

Miscellaneous Facilities

- G-1 Trench Excavation, Backfill, and Surface Restoration
- G-2 Storm Drain Crossing Over/Under Utility
- G-3 Construction Joint (Concrete Field Collar)
- G-4 Lateral Line Connection w/o Manhole
- G-5 Gate Valve, Non-Projecting Stem, Type A (Below Finish Grade), and Type B (Above Finish Grade)
- G-6 Trash Rack
- G-7 Air Vent – Vacuum Relief Valve
- G-8 Steel Guard Post
- G-9 Tree Planting Well
- G-10 Retention Basin Elevation Monument

	PUBLIC RIGHT OF WAY LINE
	PROPERTY LINE
	CHAIN LINK FENCE
	ORNAMENTAL METAL FENCE
	MASONRY BLOCK FENCE/RET. WALL
	RAILROAD TRACKS
	EDGE OF PAVEMENT
	STREET CENTERLINE
	STORM DRAIN
	SEWER LINE
	WATER LINE
	IRRIGATION LINE
	GAS LINE
	ELECTRIC UNDERGROUND LINE
	TELEPHONE UNDERGROUND LINE
	FIBER OPTIC LINE
	TRAFFIC SIGNAL LINE
	UNDERGROUND DUCT
	FUTURE FACILITY (S,SD,IRR,ETC.)
	STORM DRAIN INLET
	TEMPORARY S.D. INLET
	STORM DRAIN MANHOLE
	STORM DRAIN OUTFALL
	SEWER MANHOLE
	WATER VALVE
	UTILITY VAULT
	POWER / UTILITY POLE
	POWER POLE ANCHOR
	STREET LIGHT
	DRAINAGE DIRECTION
	SURFACE ELEVATION
	GRATE ELEVATION
	TOP OF STRUCTURE ELEVATION
	FLOWLINE ELEVATION
	TOP OF CURB ELEVATION

CONSTRUCTION LEGEND
Symbols for existing facilities on Plan Sheets

	SHEET LIMIT LINE
	EXISTING RW LINE
	NEW STORM DRAIN & SIZE
	EXISTING STORM DRAIN & SIZE
	NEW STORM DRAIN INLET
	EXISTING STORM DRAIN INLET
	NEW MANHOLE
	EXISTING MANHOLE
	NEW OUTFALL
	EXISTING OUTFALL

COVER SHEET LEGEND
Symbols for Project Overview / Sheet Index Map on Cover Sheet

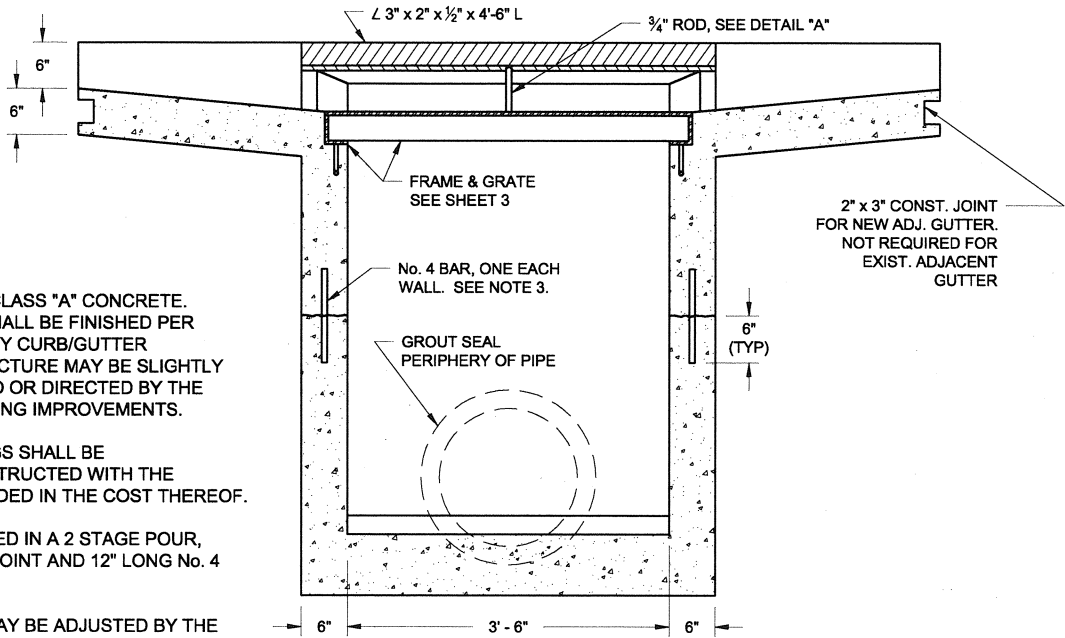
	CONCRETE PIPE (OPT. CIPCP OR RCP)
	REINFORCED CONCRETE PIPE
	PVC/CMP/HDPE (AS APPLIC.)
	JACKING PIPE
	PIPE PROFILE VIEW (PROPOSED)
	PIPE PROFILE VIEW (EXISTING)
	NEW STORM DRAIN INLET
	NEW MANHOLE
	TEMP STORM DRAIN INLET
	ENGINEER'S STATION
	CONSTRUCTION SLOPE

NEW CONSTRUCTION LINE WORK
For Plan/Profile Sheet preparation

- CONSTRUCT XX" CONCRETE PIPE
- INSTALL XX LF OF XX" RCP, PVC, ETC. (AS APPLICABLE)
- CONSTRUCT TYPE " " CASE " " MANHOLE
- CONSTRUCT TYPE " " INLET
- BORE AND JACK XX LF OF XX" RGRCP CLASS V JACKING PIPE

NEW CONSTRUCTION CALLOUTS
For Plan/Profile Sheet preparation

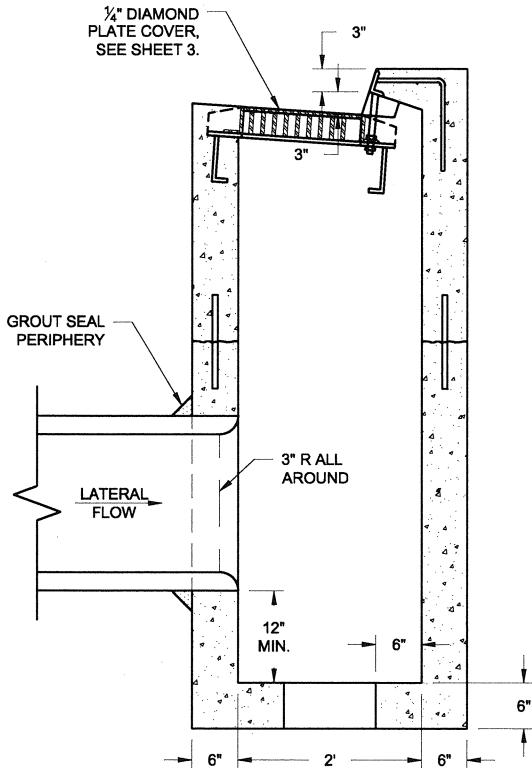
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	LEGENDS FOR CONSTRUCTION DRAWINGS	
MARK	DATE	DESCRIPTION			
			APPROVED BY: 	SCALE AS SHOWN	DRAWING No. <u> A </u> SHEET <u> 1 </u> OF <u> 1 </u>
ADOPTED	4/1/2011				



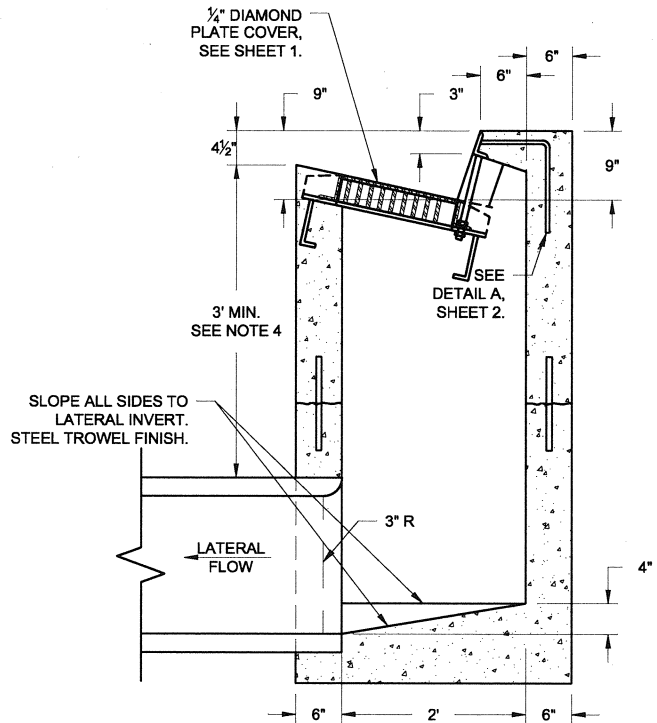
SECTION A-A (SEE SHEET 2 FOR PLAN VIEW)
SCALE: 1" = 2'

NOTES:

1. STRUCTURE SHALL BE CLASS "A" CONCRETE. EXPOSED SURFACES SHALL BE FINISHED PER JURISDICTIONAL AGENCY CURB/GUTTER SPECIFICATIONS. STRUCTURE MAY BE SLIGHTLY MODIFIED AS APPROVED OR DIRECTED BY THE ENGINEER TO FIT EXISTING IMPROVEMENTS.
2. 2' CURB & GUTTER WINGS SHALL BE MONOLITHICALLY CONSTRUCTED WITH THE STRUCTURE AND INCLUDED IN THE COST THEREOF.
3. IF INLET IS CONSTRUCTED IN A 2 STAGE POUR, PROVIDE ROUGHENED JOINT AND 12" LONG No. 4 BAR IN EACH WALL.
4. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.



OUTLET DETAIL
SCALE: 1" = 2'



SECTION B-B
SCALE: 1" = 2'

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

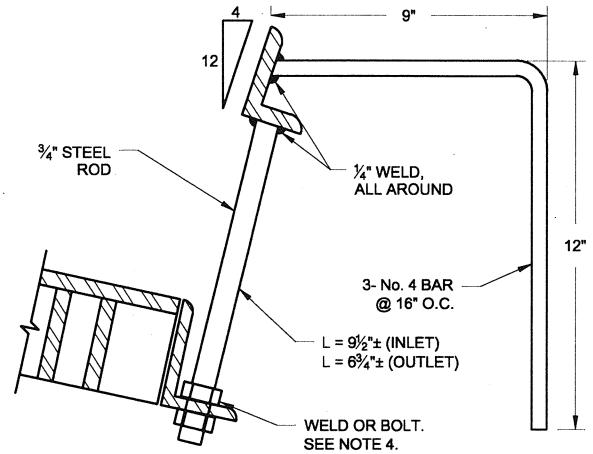
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**TYPE "A"
INLET/OUTLET**

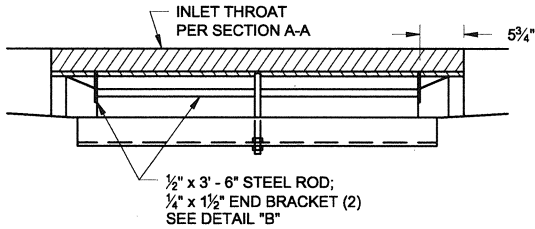
SCALE: AS SHOWN DRAWING No. A-1
SHEET 1 OF 3

NOTES:

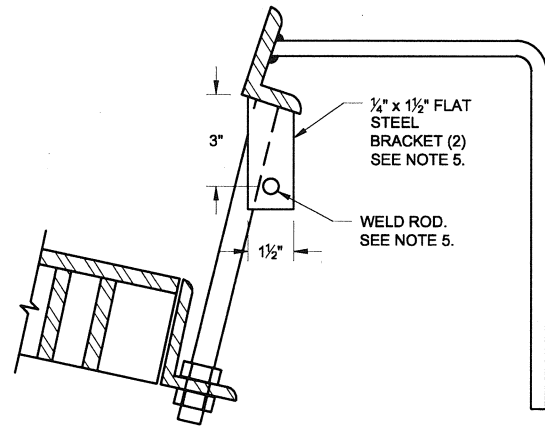
1. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
2. ALL METAL PARTS SHALL BE STRUCTURAL GRADE STEEL.
3. FRAME, GRATE, COVER AND ALL OTHER EXPOSED METAL PARTS SHALL BE COATED WITH AN APPROVED ASPHALTUM BLACK PAINT OR OTHER COATING APPROVED BY THE ENGINEER, BY DIPPING OR PAINTING.
4. ATTACH BOTTOM OF VERTICAL $\frac{3}{4}$ " STEEL ROD TO GRATE FRAME BY THREADED END AND LOCK NUTS OR BY WELDING ALL AROUND. TACK WELD NUTS IF USED.
5. WELD ENDS OF $\frac{1}{2}$ " HORIZONTAL ROD ALL AROUND TO END BRACKETS; TACK WELD TO VERTICAL ROD. WELD BRACKET TOPS TO UNDERSIDE OF ANGLE IRON.



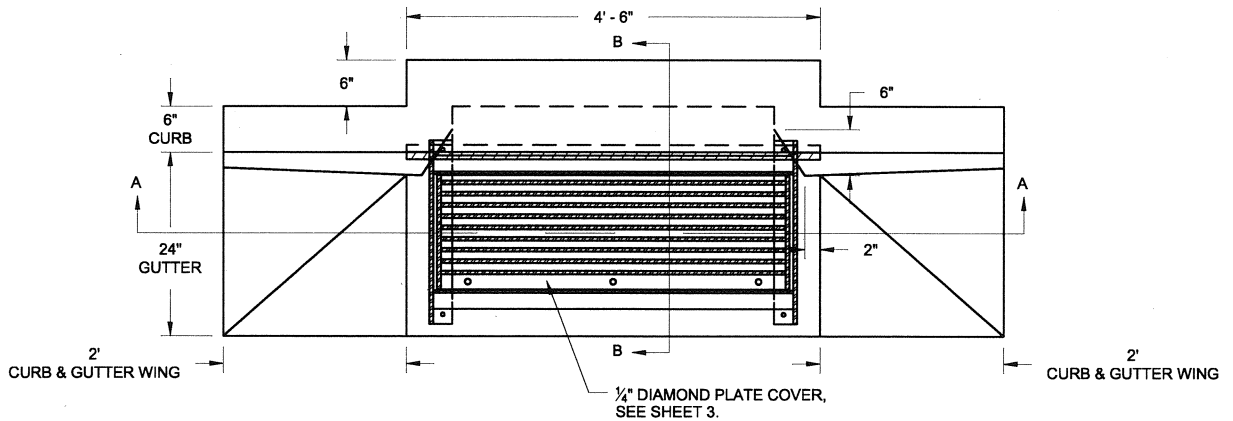
DETAIL "A"
SCALE: 1" = 6"



HORIZONTAL ROD*
SCALE: 1" = 2'
*WHEN REQUIRED



DETAIL "B"
SCALE: 1" = 6"



PLAN
SCALE: 1" = 2'

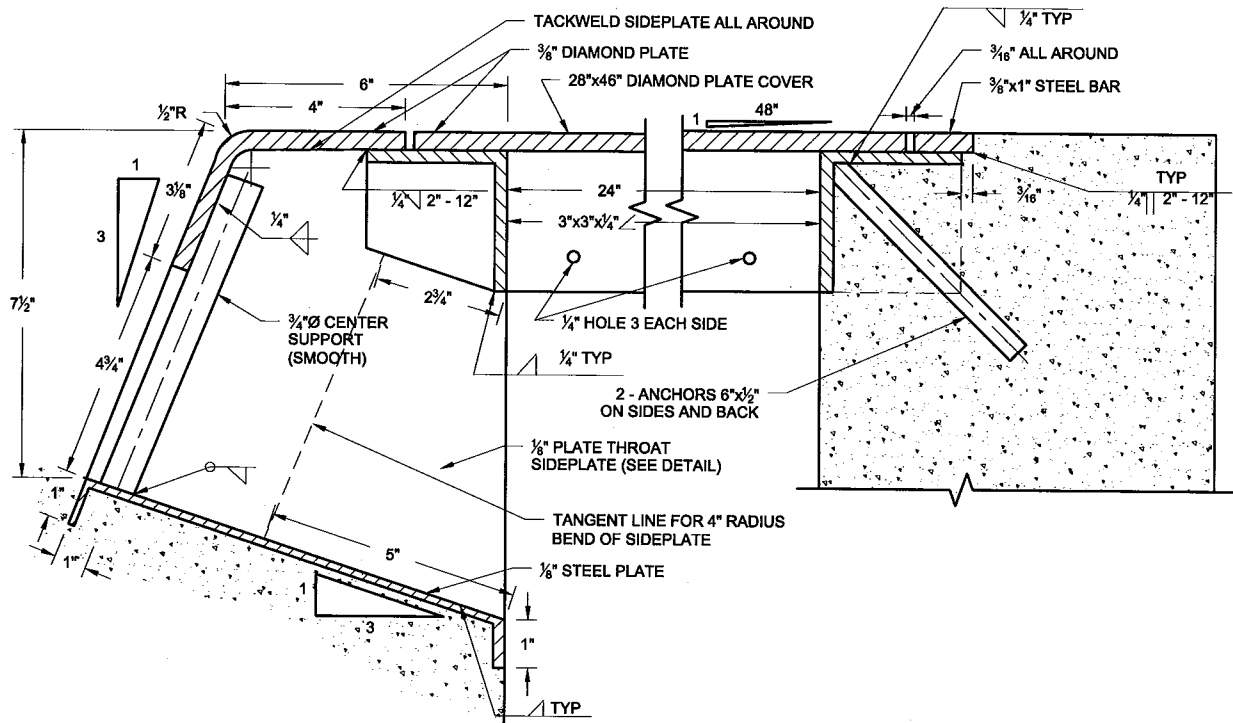
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

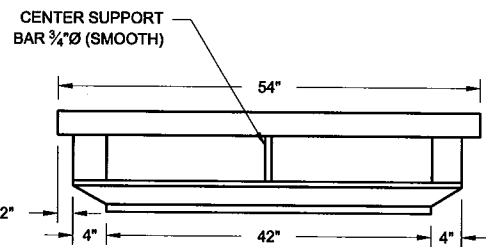
APPROVED BY:
[Signature] 4-1-11
DISTRICT ENGINEER DATE

**TYPE "A"
INLET/OUTLET**

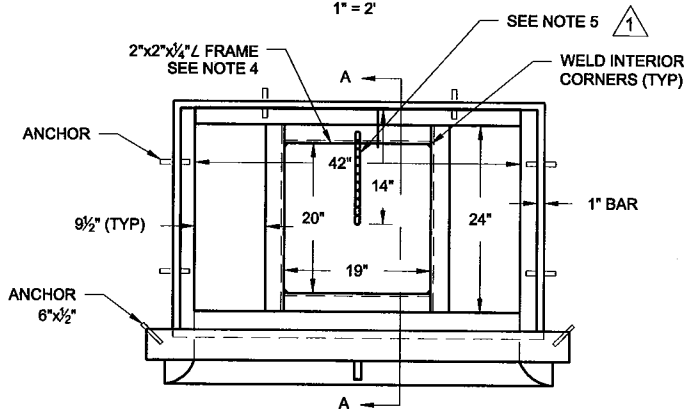
SCALE: AS SHOWN DRAWING No. A-1
SHEET 2 OF 3



SECTION "A-A"
1" = 4"



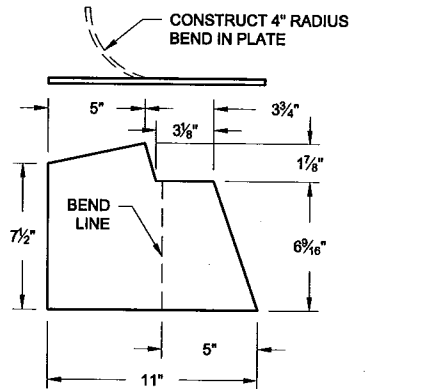
FRONT
1" = 2"



PLAN
1" = 2"

NOTES:

1. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
2. ALL PARTS SHALL BE STRUCTURAL GRADE STEEL.
3. ALL EXPOSED METAL PARTS SHALL BE PAINTED WITH OR DIPPED IN A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.
4. INSTALL FRAME AFTER INLET IS CONSTRUCTED. TOP SURFACE TO BE FLUSH W/INLET FRAME. WELD TO INLET FRAME ON UNDERNEATH SIDE.
5. SECURE DIAMOND PLATE COVER TO FRAME BY WELDING SECURITY CHAIN TO COVER AND FRAME AS DIRECTED BY ENGINEER. CHAIN SUPPLIED BY DISTRICT.



THROAT SIDEPLATE - 1/8" STEEL
1" = 10"

REVISIONS

MARK	DATE	DESCRIPTION
1	1-1-12	NOTE ADDED

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

Jerry Salzman
DISTRICT ENGINEER DATE 1-1-12

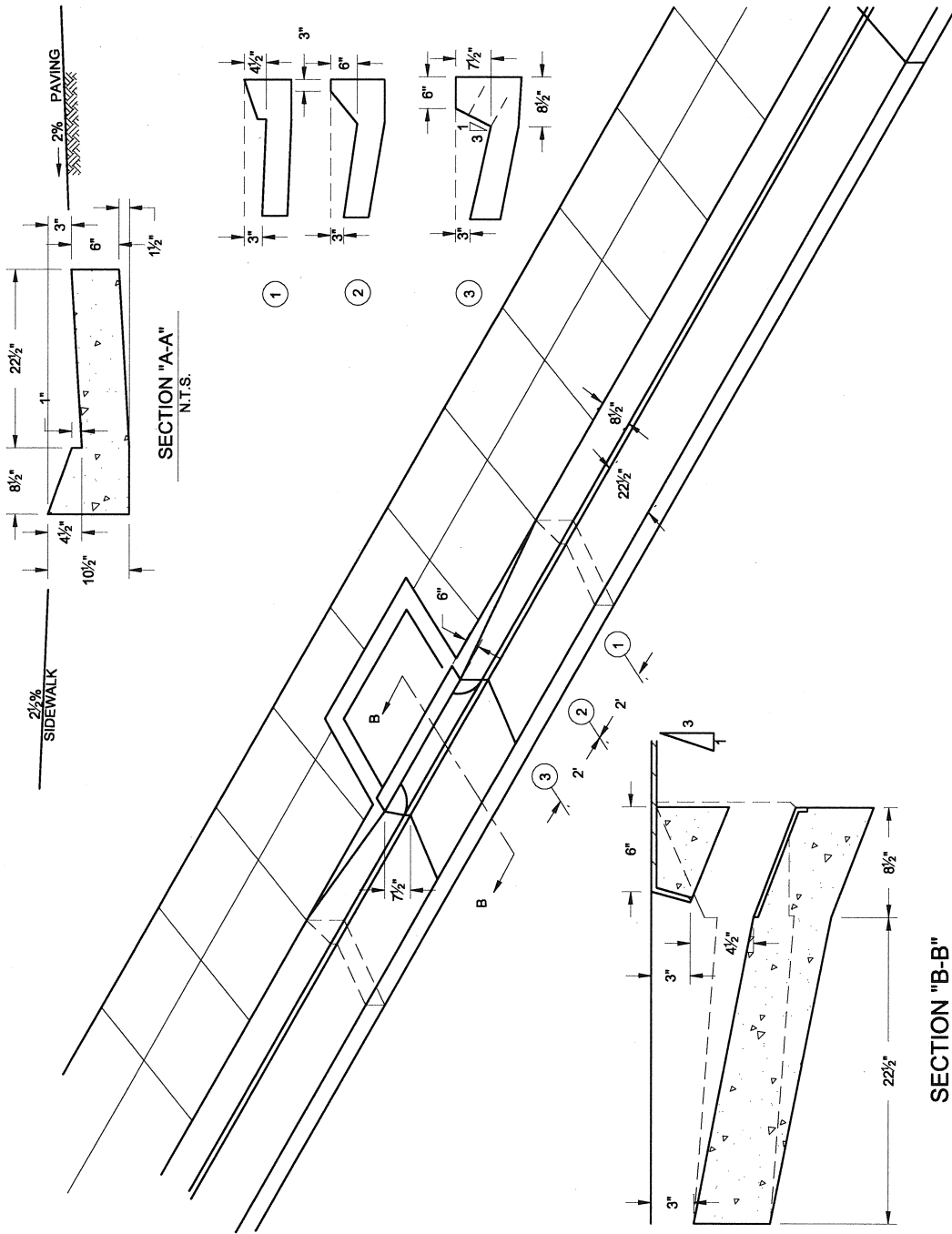
**TYPE "B" INLET
FOR 4 1/2" WEDGE CURB**

ADOPTED

4/1/2011

SCALE
AS SHOWN

DRAWING No. A-2
SHEET 2 OF 3



REVISIONS		
MARK	DATE	DESCRIPTION

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

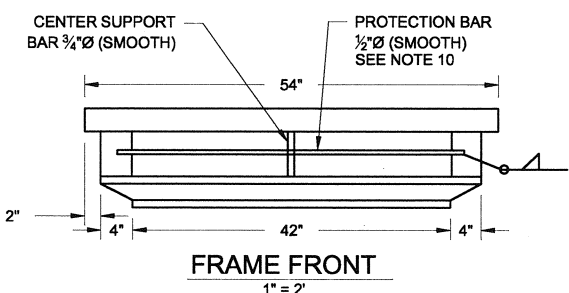
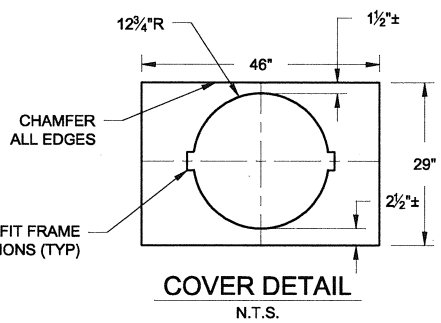
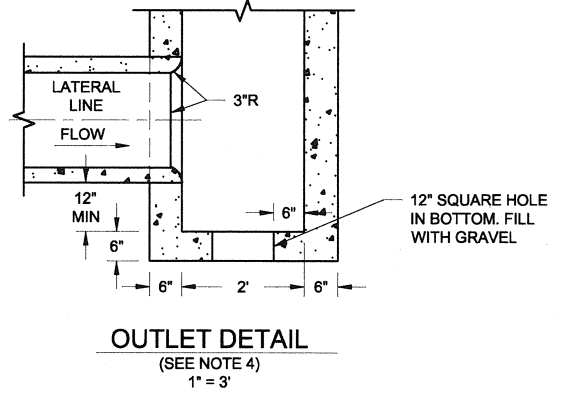
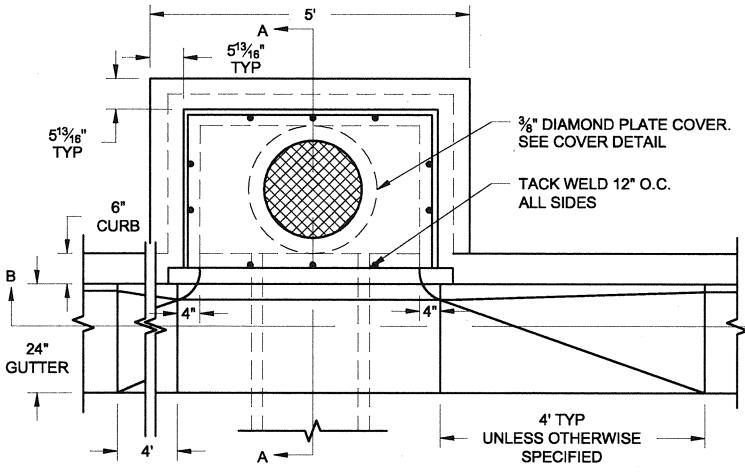
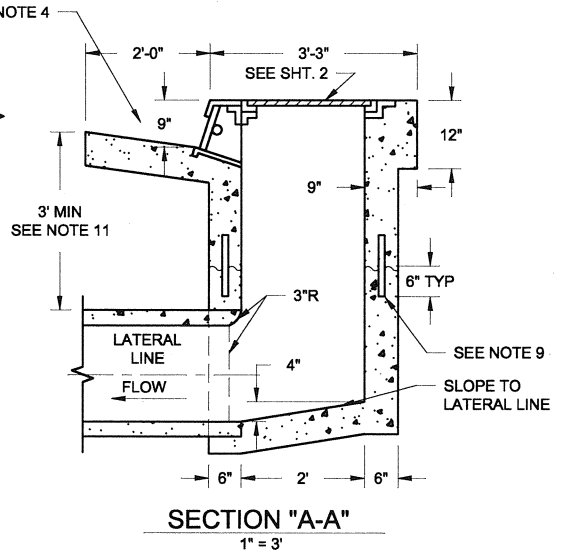
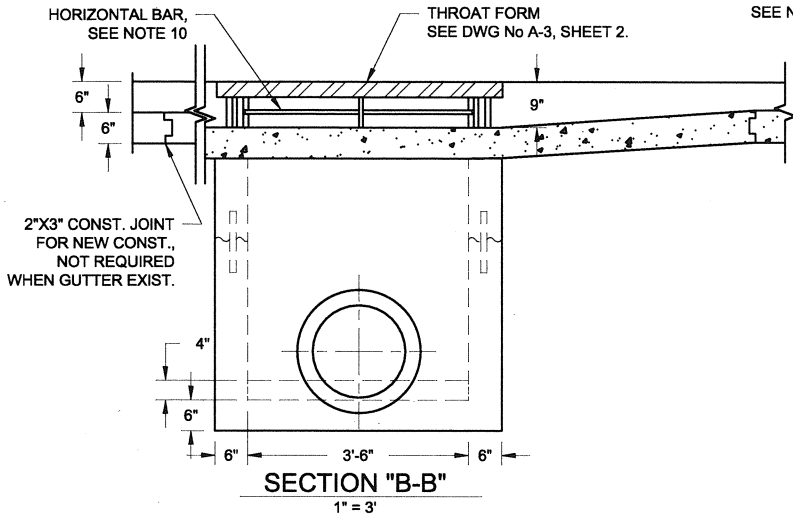
**TYPE "B" INLET/OUTLET
FOR 4 1/2" WEDGE CURB**

SCALE AS SHOWN

DRAWING No. A-2
SHEET 3 OF 3

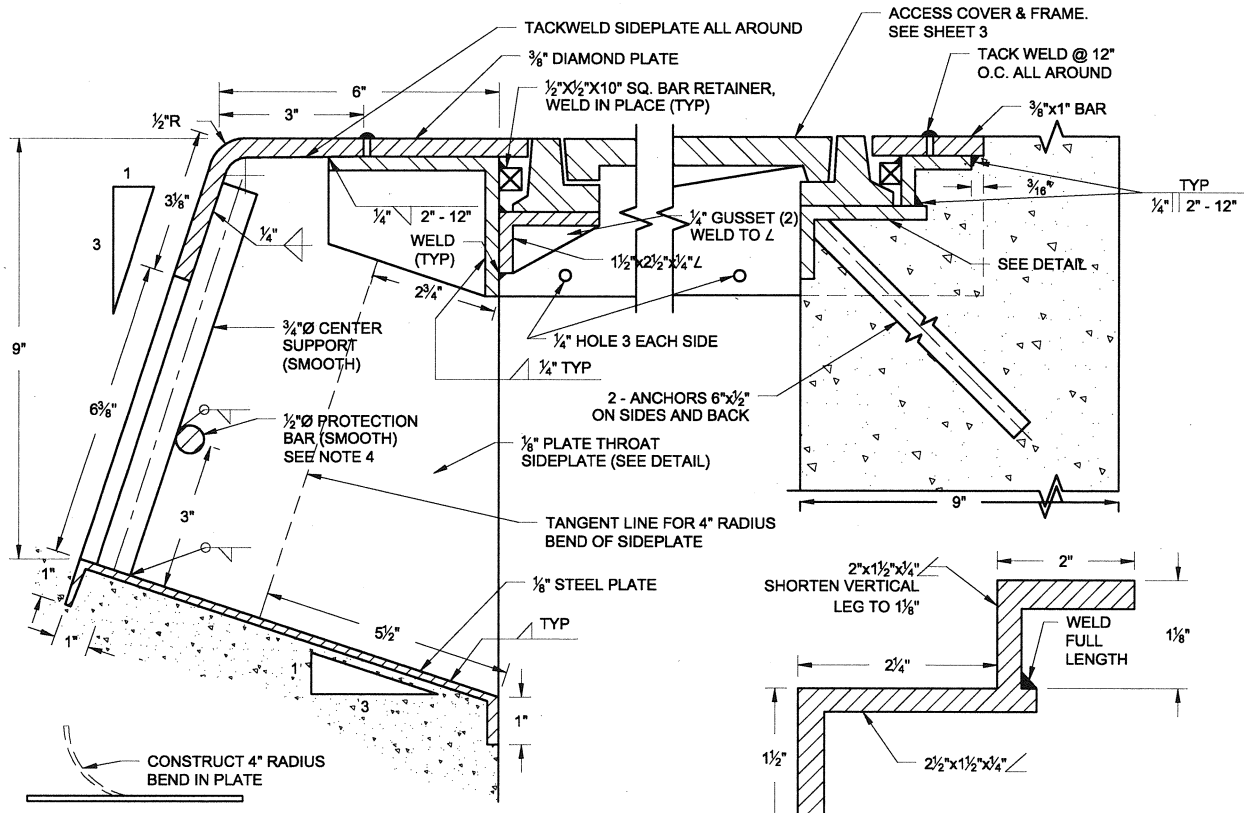
ADOPTED

4/1/2011

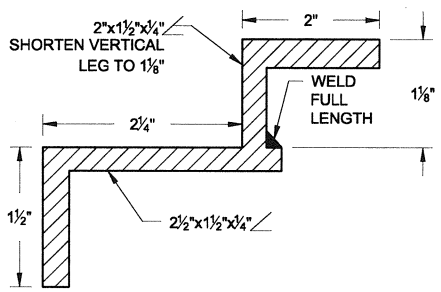


- NOTES:
1. THE INLET MAY BE MODIFIED SLIGHTLY TO MATCH EXISTING IMPROVEMENTS, AS DIRECTED BY THE ENGINEER.
 2. STRUCTURE SHALL BE CLASS "A" CONCRETE. EXPOSED SURFACES SHALL BE FINISHED AS PER CURB SPECIFICATIONS.
 3. COST OF ACCESS COVER AND BASE, DIAMOND PLATE COVER, FRAME AND GRATE AND THROAT FORM SHALL BE INCLUDED IN PRICE OF INLET OR OUTLET.
 4. WHEN EMPLOYED AS OUTLET, PLACE GUTTER CONCRETE TO 6" BELOW TOP OF CURB.
 5. 4' CURB AND GUTTER WINGS SHALL BE INCLUDED IN THE PRICE OF THE INLET/OUTLET.
 6. ADDITIONAL CURB AND GUTTER SHALL BE CONSTRUCTED OR RECONSTRUCTED ON EACH SIDE OF BOX AS INDICATED ON THE PLANS AND COST THEREOF SHALL BE INCLUDED IN PRICE OF INLET OR OUTLET.
 7. FLOOR OF THE INLET SHALL SLOPE FROM ALL WALLS TO THE LATERAL LINE AND SHALL BE GIVEN A STEEL TROWELED FINISH.
 8. AT THE CONTACT POINT BETWEEN THE LATERAL LINE AND THE INLET WALL A SMOOTH 3" RADIUS CURVE SHALL BE CONSTRUCTED.
 9. IF INLET IS CONSTRUCTED IN A TWO STAGE POUR, PROVIDE A ROUGHENED CONSTRUCTION JOINT AND PLACE ONE No. 4 BAR 12" LONG IN EACH OF THE FOUR WALLS, AS SHOWN.
 10. DELETE HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS OR WHERE USED AS AN OUTLET.
 11. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

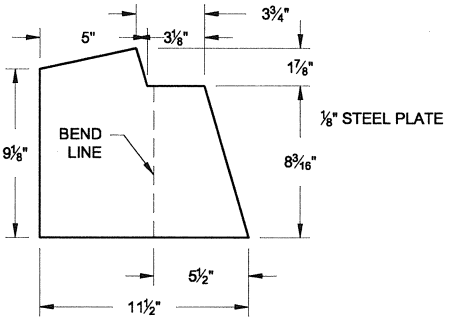
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TYPE "C" INLET/OUTLET FOR 6" CURB AND GUTTER
MARK	DATE	DESCRIPTION		
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER	SCALE AS SHOWN
			DATE 4-1-11	DRAWING No. A-3 SHEET 1 OF 3



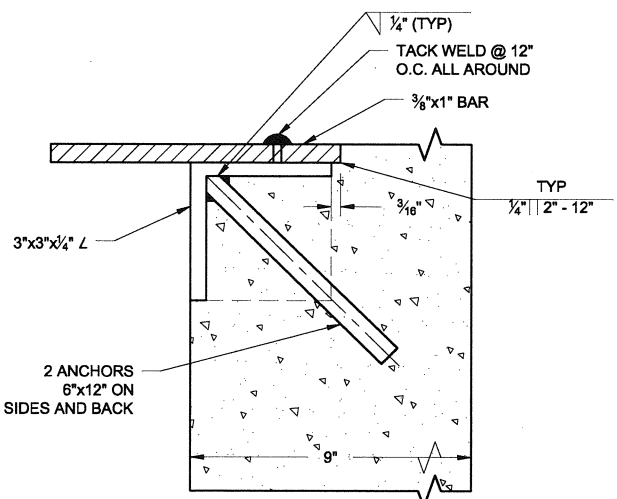
SECTION "A-A"
1" = 4"



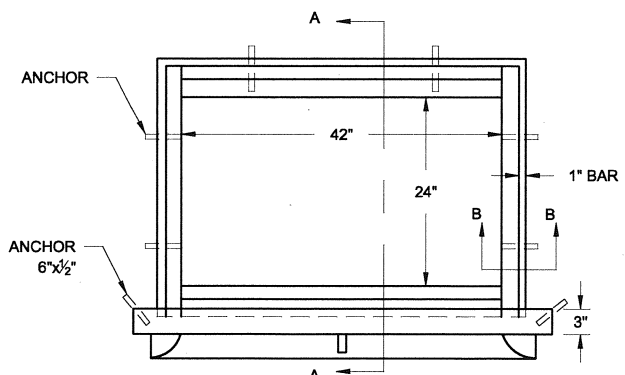
ACCESS FRAME SUPPORT DETAIL
1" = 2"



THROAT SIDEPLATE
1" = 10"



SECTION "B-B"
N.T.S.



FRAME PLAN
1" = 2"

- NOTES:
1. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
 2. ALL PARTS SHALL BE STRUCTURAL GRADE STEEL.
 3. ALL EXPOSED METAL PARTS SHALL BE COATED WITH A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.
 4. DELETE HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS, OR WHERE USED AS AN OUTLET.

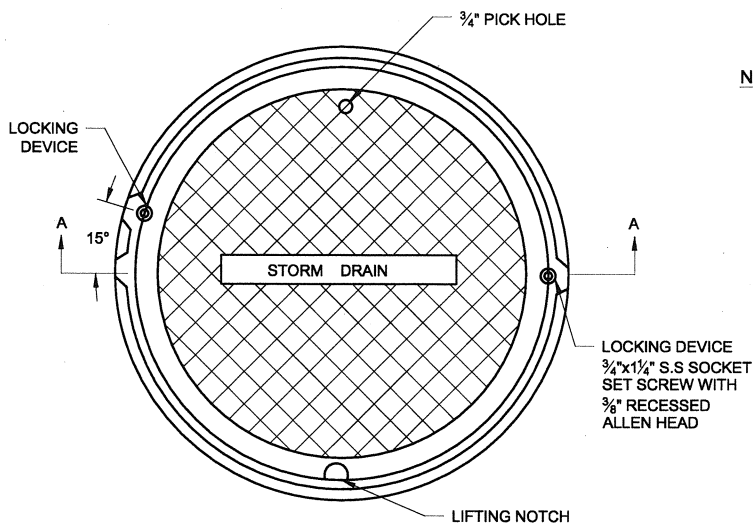
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**TYPE "C" INLET
THROAT FORM AND
ACCESS FRAME SUPPORT**

SCALE AS SHOWN DRAWING No. A-3
SHEET 2 OF 3

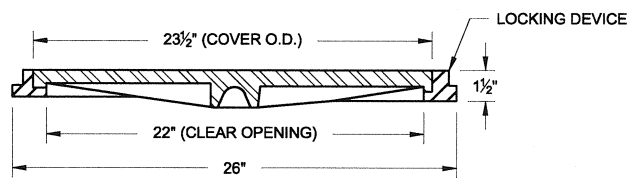


ACCESS COVER AND BASE

N.T.S.

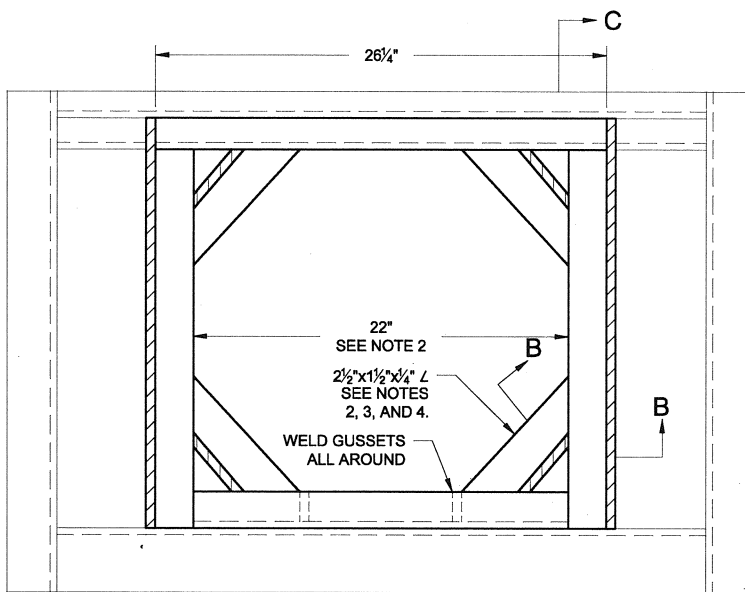
NOTES:

1. ACCESS COVER AND BASE SHALL BE ALHAMBRA FOUNDRY A-1530-B OR APPROVED EQUAL.
2. CENTER COVER BASE AND GRIND L IRON HORIZONTAL LEG TO PROVIDE 22" CLEAR OPENING IN ALL DIRECTIONS.
3. GRIND OR CUT 1 1/2" VERTICAL LEG OF L IRON TO PROVIDE 1/8" HEIGHT AS SHOWN.
4. ALL L IRON PARTS SHALL BE STRUCTURAL GRADE STEEL, DIPPED IN OR PAINTED WITH A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.

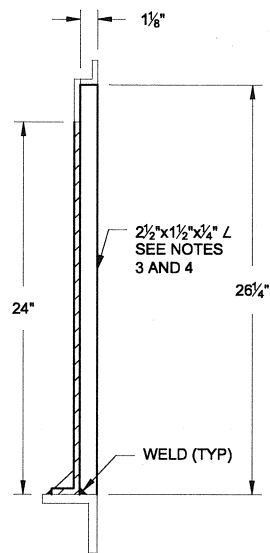


SECTION "A-A"

N.T.S.



ACCESS COVER SUPPORT FRAME



SECTION "C-C"

N.T.S.



SECTION "B-B"

N.T.S.

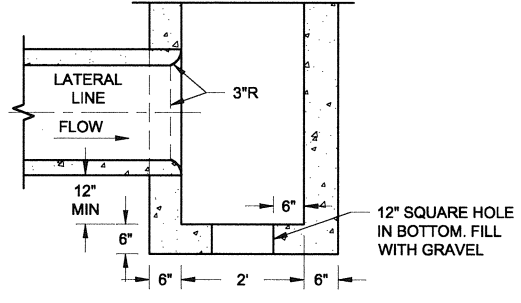
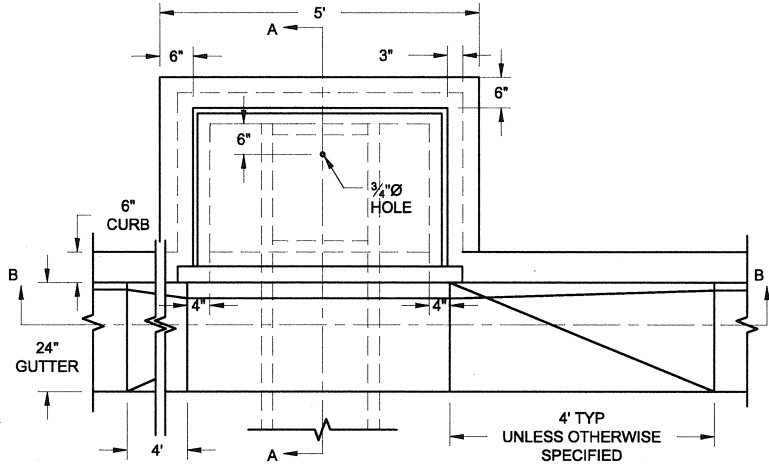
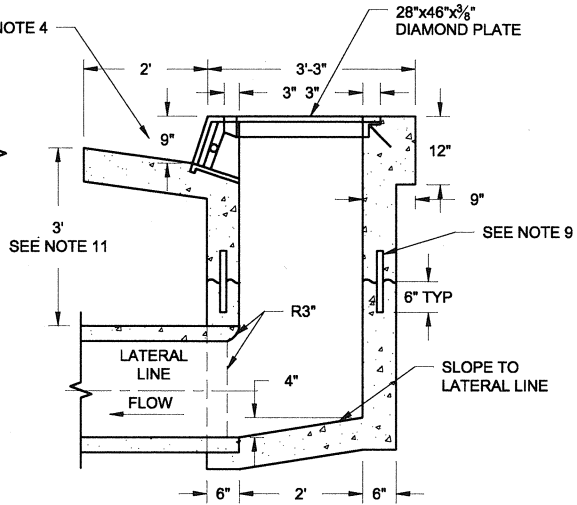
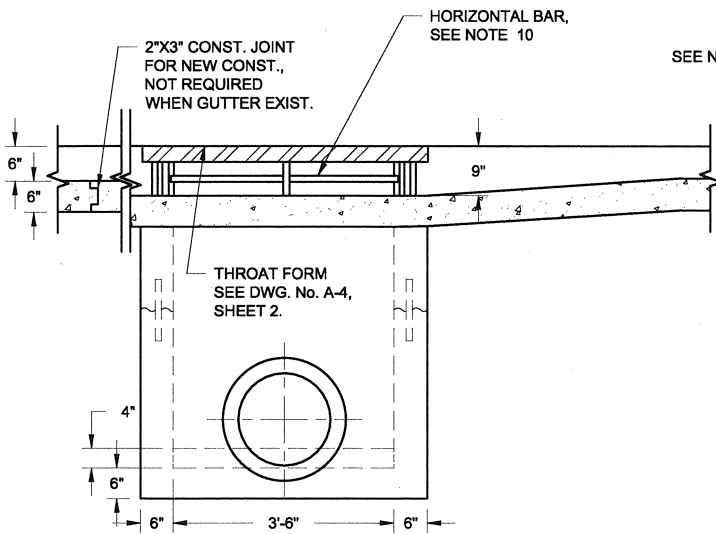
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

APPROVED BY: *[Signature]* 4-1-11
 DISTRICT ENGINEER DATE

TYPE "C" INLET ACCESS COVER AND FRAME

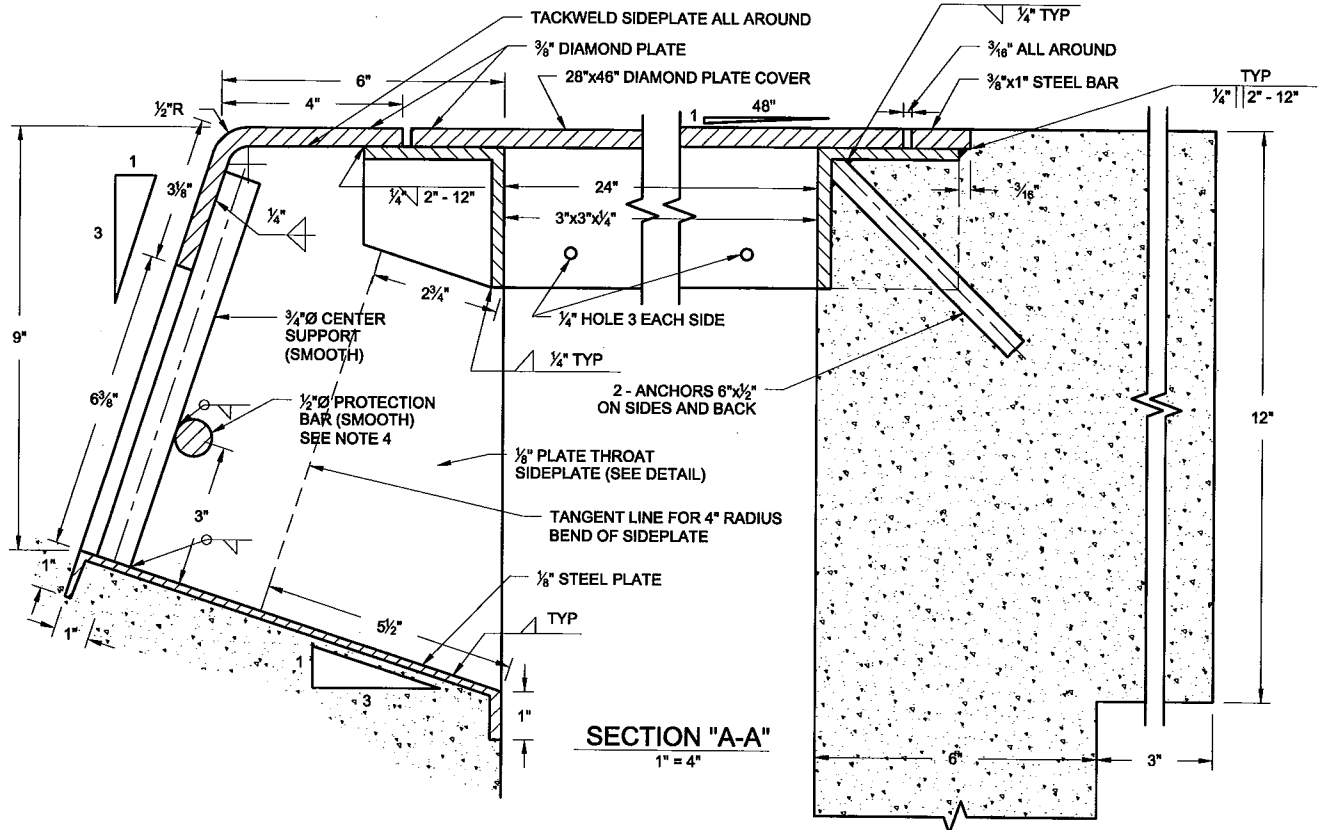
SCALE AS SHOWN DRAWING No. A-3
 SHEET 3 OF 3



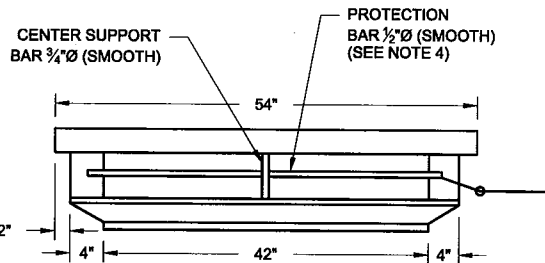
NOTES:

1. THE INLET MAY BE MODIFIED SLIGHTLY TO MATCH EXISTING IMPROVEMENTS, AS DIRECTED BY THE ENGINEER.
2. STRUCTURE SHALL BE CLASS "A" CONCRETE. EXPOSED SURFACES SHALL BE FINISHED AS PER CURB SPECIFICATIONS.
3. COST OF FRAME AND GRATE AND THROAT FORM SHALL BE INCLUDED IN PRICE OF INLET OR OUTLET.
4. WHEN EMPLOYED AS OUTLET, PLACE GUTTER CONCRETE TO 6" BELOW TOP OF CURB GRADE.
5. 4' CURB AND GUTTER WINGS SHALL BE INCLUDED IN THE PRICE OF THE INLET/OUTLET.
6. ADDITIONAL CURB AND GUTTER SHALL BE CONSTRUCTED OR RECONSTRUCTED ON EACH SIDE OF BOX AS INDICATED ON THE PLANS AND COST THEREOF SHALL BE INCLUDED IN PRICE OF INLET OR OUTLET.
7. FLOOR OF THE INLET SHALL SLOPE FROM ALL WALLS TO THE LATERAL LINE AND SHALL BE GIVEN A STEEL TROWELED FINISH.
8. AT THE CONTACT POINT BETWEEN THE LATERAL LINE AND THE INLET WALL A SMOOTH 3" RADIUS CURVE SHALL BE CONSTRUCTED.
9. IF INLET IS CONSTRUCTED IN A TWO STAGE POUR, PROVIDE A ROUGHENED CONSTRUCTION JOINT AND PLACE ONE No. 4 BAR 12" LONG IN EACH OF THE FOUR WALLS, AS SHOWN.
10. DELETE HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS, OR WHERE USED AS AN OUTLET.
11. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TYPE "D" INLET/OUTLET FOR 6" CURB & GUTTER	
MARK	DATE	DESCRIPTION		SCALE	DRAWING No.
			APPROVED BY:	AS SHOWN	A-4
ADOPTED	4/1/2011		DISTRICT ENGINEER	DATE	1 OF 2



SECTION "A-A"
1" = 4"

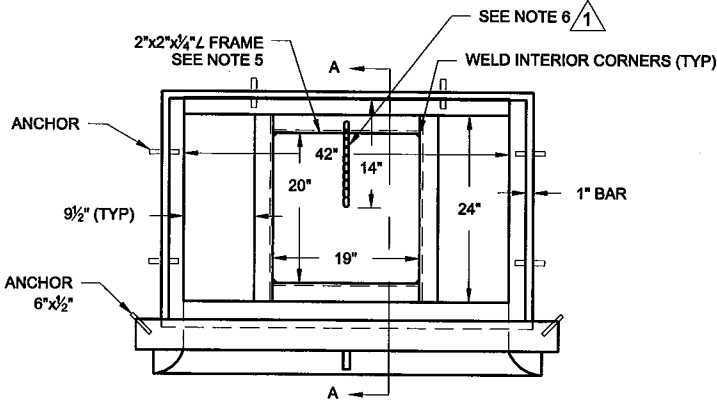


FRONT
1" = 2"

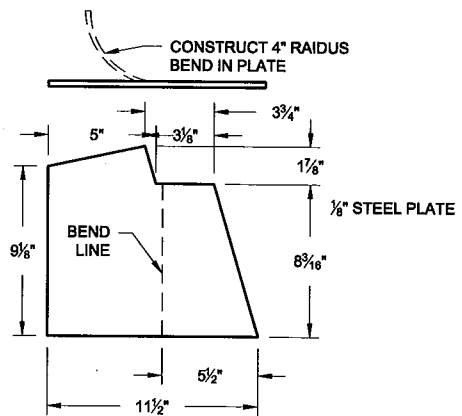
NOTES:

1. ALL DIMENSIONS ARE FINISHED DIMENSIONS
2. ALL PARTS SHALL BE STRUCTURAL GRADE STEEL.
3. ALL EXPOSED METAL PARTS SHALL BE PAINTED OR DIPPED WITH A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.
4. DELETE HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLAN OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS OR WHERE USED AS AN OUTLET.
5. INSTALL FRAME AFTER INLET IS CONSTRUCTED. TOP SURFACE TO BE FLUSH W/INLET FRAME. WELD TO INLET FRAME ON UNDERNEATH SIDE.
6. SECURE DIAMOND PLATE COVER TO FRAME BY WELDING SECURITY CHAIN TO COVER AND FRAME AS DIRECTED BY ENGINEER. CHAIN SUPPLIED BY DISTRICT.

1/6.



PLAN
1" = 2"



THROAT SIDEPLATE
1" = 10"

REVISIONS		
MARK	DATE	DESCRIPTION
1	1-1-12	NOTE ADDED
ADOPTED		4/1/2011

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

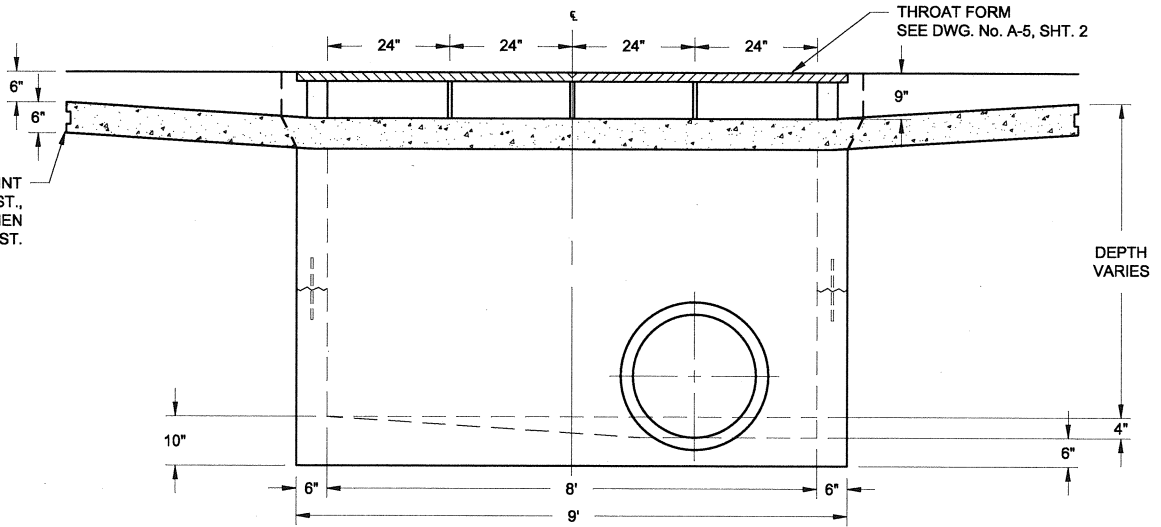
APPROVED BY: *[Signature]* 1-1-12
DISTRICT ENGINEER DATE

**TYPE "D" INLET
THROAT FORM & FRAME
FOR 6" CURB & GUTTER**

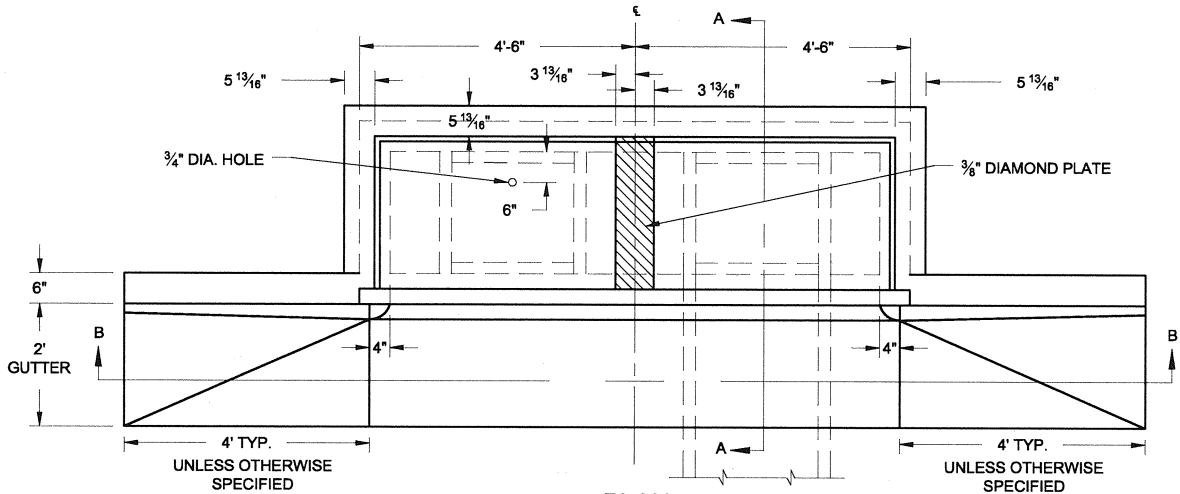
SCALE AS SHOWN DRAWING No. A-4
SHEET 2 OF 2

2" X 3" COST. JOINT FOR NEW CONST., NOT REQ'D. WHEN GUTTER EXIST.

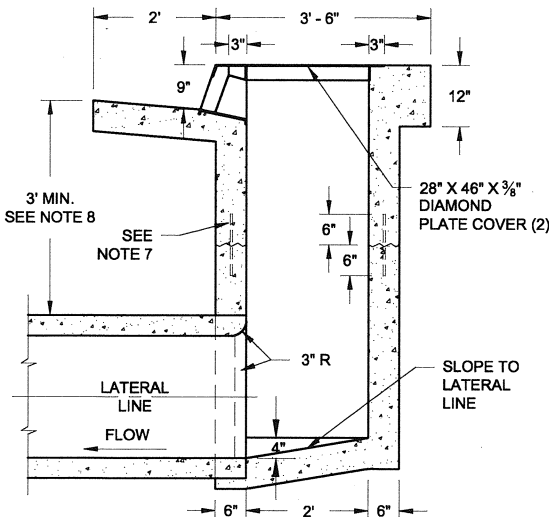
THROAT FORM SEE DWG. No. A-5, SHT. 2



SECTION "B-B"
1" = 3'



PLAN
1" = 3'



SECTION "A-A"
1" = 3'

NOTES:

1. THE INLET MAY BE MODIFIED SLIGHTLY TO MATCH EXISTING IMPROVEMENTS, AS DIRECTED BY THE ENGINEER.
2. STRUCTURE SHALL BE CLASS "A" CONCRETE. EXPOSED SURFACES SHALL BE FINISHED AS PER CURB SPECIFICATIONS.
3. COST OF FRAME, THROAT FORM AND CURB & GUTTER WINGS SHALL BE INCLUDED IN PRICE OF INLET.
4. ADDITIONAL CURB & GUTTER SHALL BE CONSTRUCTED OR RECONSTRUCTED ON EACH SIDE OF BOX AS INDICATED ON THE PLANS AND COST THEREOF SHALL BE INCLUDED IN PRICE OF INLET.
5. FLOOR OF THE INLET SHALL SLOPE FROM ALL WALLS TO THE LATERAL LINE AND SHALL BE GIVEN A STEEL TROWELED FINISH.
6. AT THE CONTACT POINT BETWEEN THE LATERAL LINE AND THE INLET WALL A SMOOTH 3" RADIUS CURVE SHALL BE CONSTRUCTED.
7. IF INLET IS CONSTRUCTED IN A TWO STAGE POUR, PROVIDE A ROUGHENED CONSTRUCTION JOINT AND PLACE ONE #4 BAR 12" LONG IN EACH OF THE FOUR WALLS, AS SHOWN.
8. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

REVISIONS

MARK	DATE	DESCRIPTION

ADOPTED

4/1/2011

FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT

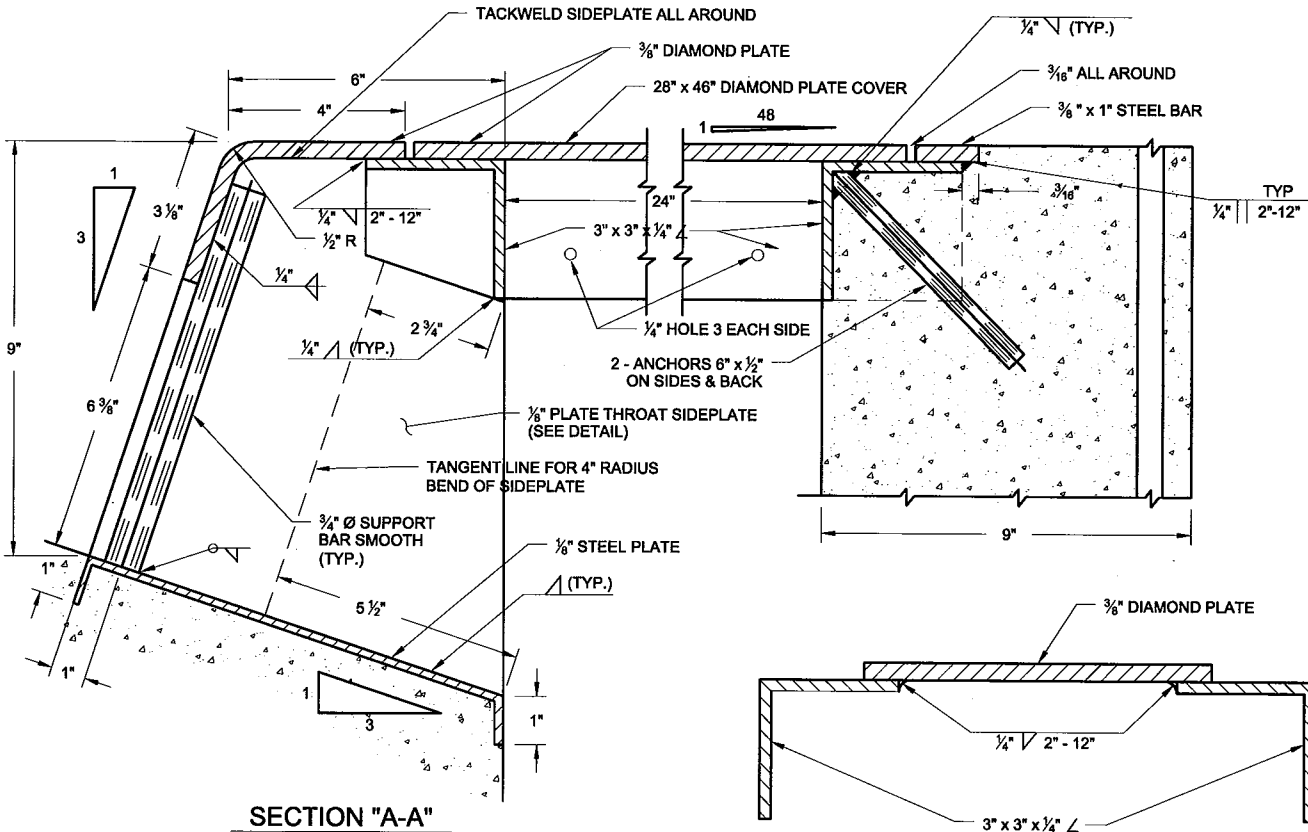
APPROVED BY:

[Signature] 4-1-11
DISTRICT ENGINEER DATE

DOUBLE
TYPE "D" INLET

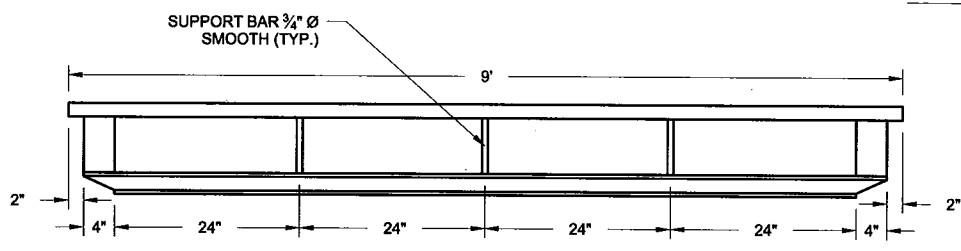
SCALE
AS SHOWN

DRAWING No. A-5
SHEET 1 OF 2

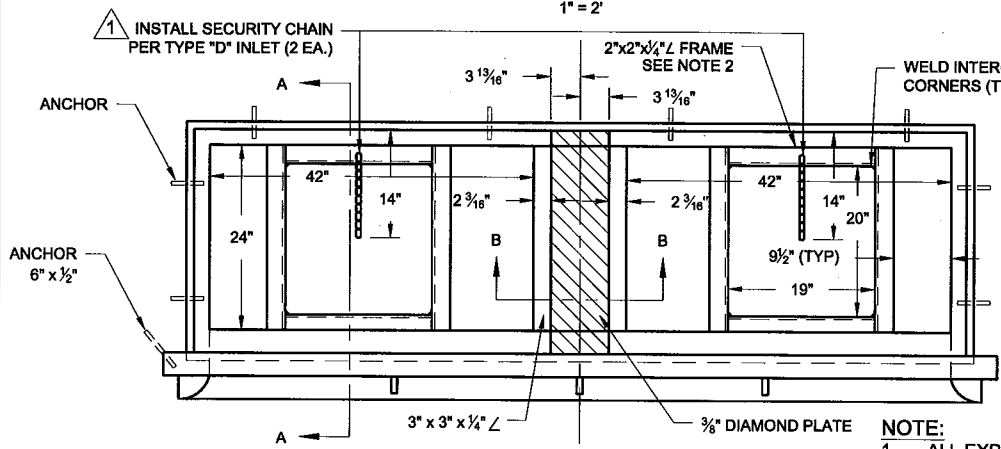


SECTION "A-A"
1" = 4"

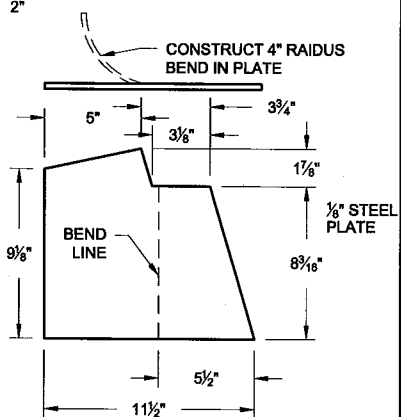
SECTION "B-B"
1" = 4"



FRONT
1" = 2"



PLAN
1" = 2"



THROAT SIDEPLATE
1" = 10"

- NOTE:**
1. ALL EXPOSED METAL PARTS SHALL BE PAINTED OR DIPPED WITH A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.
 2. INSTALL 2 FRAMES AFTER INLET IS CONSTRUCTED. TOP SURFACE TO BE FLUSH W/INLET FRAME. WELD TO INLET FRAME ON UNDERNEATH SIDE.

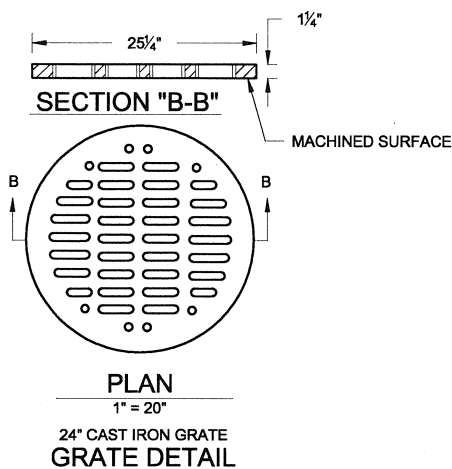
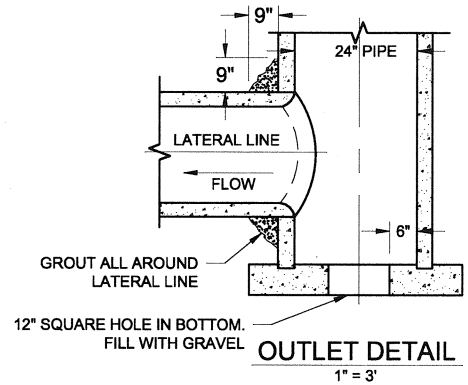
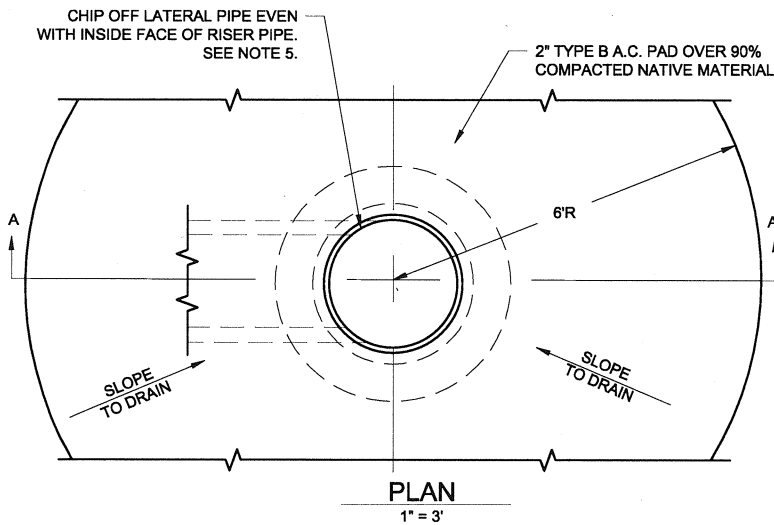
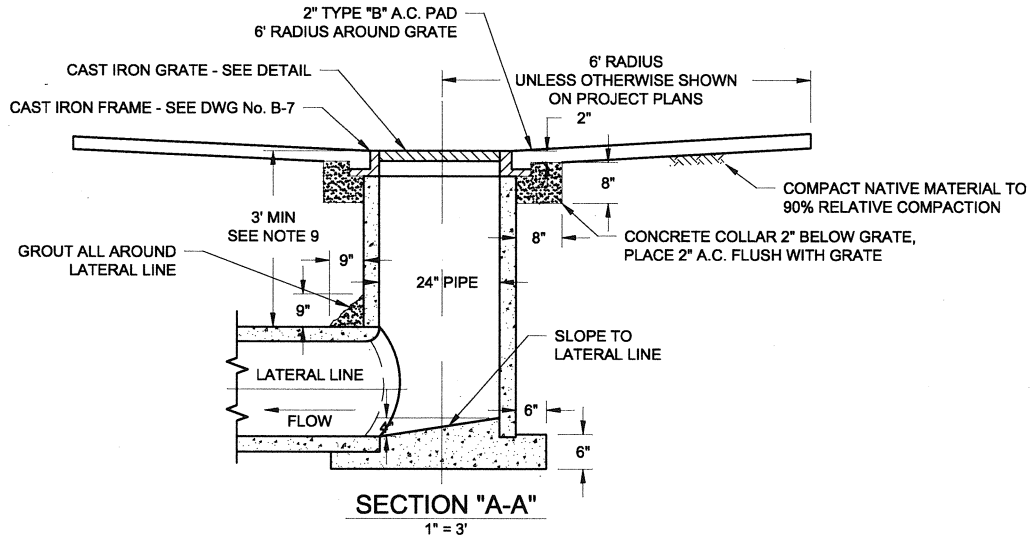
REVISIONS		
MARK	DATE	DESCRIPTION
1	1-1-12	NOTE ADDED
ADOPTED		4/1/2011

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:
[Signature] 1-1-12
DISTRICT ENGINEER DATE

**DOUBLE
TYPE "D" INLET
THROAT FORM & FRAME**

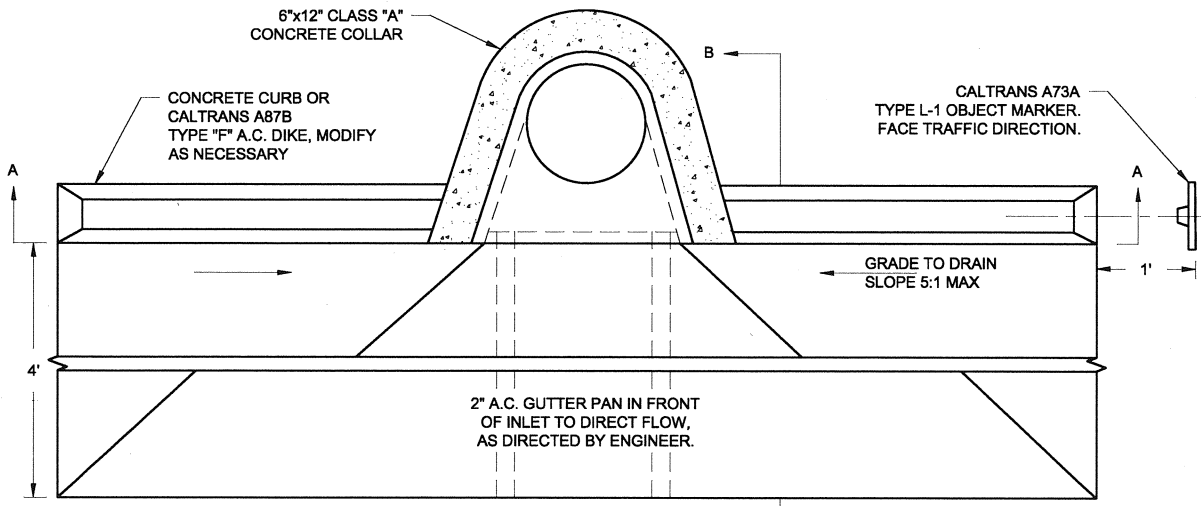
SCALE AS SHOWN DRAWING No. A-5
SHEET 2 OF 2



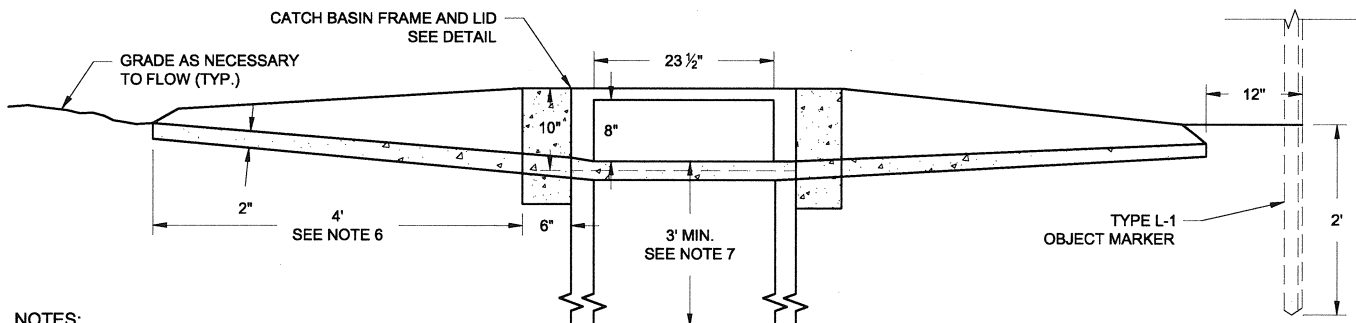
NOTES:

1. 24" CONCRETE RISER PIPE SHALL BE A.S.T.M. DESIGNATION C 118.
2. BREAK OUT RISER PIPE AND CUT LATERAL LINE NEATLY ALONG JOINT. FILL JOINT SPACE WITH MORTAR.
3. CLASS "A" CONCRETE BASE SHALL BE PROVIDED FOR 24" RISER PIPE AS SHOWN.
4. COST OF GRATE AND RING SHALL BE INCLUDED IN PRICE OF INLET OR OUTLET.
5. AT THE CONTACT POINT BETWEEN THE LATERAL LINE AND THE INLET WALL A SMOOTH 3" RADIUS CURVE SHALL BE CONSTRUCTED.
6. FLOOR OF THE INLET SHALL SLOPE FROM ALL WALLS TO THE LATERAL LINE AND SHALL BE GIVEN A STEEL TROWELED FINISH.
7. 2" TYPE B A.C. PAD SHALL SLOPE AWAY FROM GRATE ON OUTLET OR AS DIRECTED BY ENGINEER.
8. COST OF THE 2"x6" DIAMETER A.C. PAD AND ALL GRADING IS TO BE INCLUDED IN PRICE OF INLET OR OUTLET.
9. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

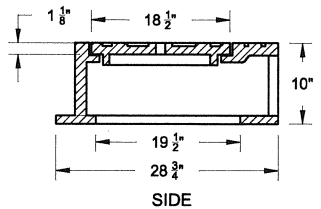
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT		TYPE "E" INLET TEMPORARY, WITH SLOTTED GRATE	
MARK	DATE	DESCRIPTION				
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER		SCALE AS SHOWN	DRAWING No. A-6 SHEET 1 OF 1



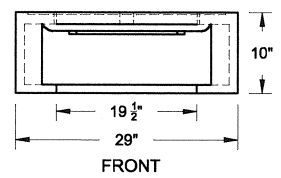
PLAN
1" = 2"



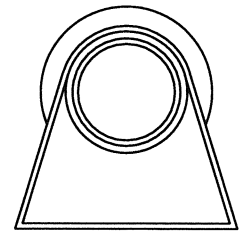
SECTION "A-A"
1" = 2"



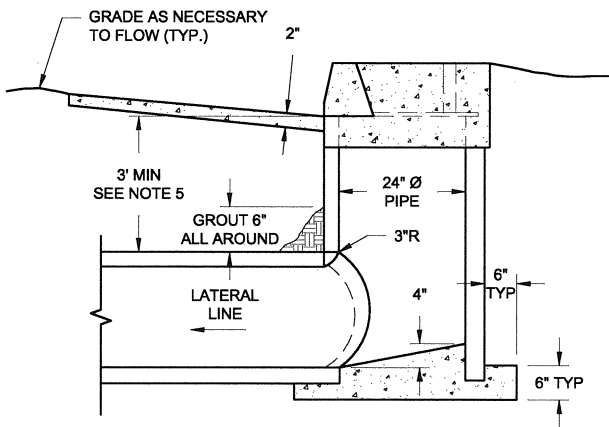
SIDE



FRONT



LID DETAIL
N.T.S.




SECTION "B-B"
1" = 3"

NOTES:

1. 24" CONCRETE RISER PIPE SHALL BE A.S.T.M. C-118 OR BETTER.
2. BREAK OUT OPENING IN RISER PIPE TO FIT LATERAL. CUT LATERAL NEATLY TO FIT CURVATURE OF RISER. FILL JOINT SPACE WITH MORTAR.
3. FLOOR OF INLET SHALL SLOPE AS SHOWN, WITH STEEL TROWEL FINISH.
4. COST OF A.C. GUTTER PAN, DIKES, OBJECT MARKER, AND GRADING AROUND INLET TO BE INCLUDED IN THE INLET PRICE.
5. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.
6. CURB SHALL BE OF SUFFICIENT LENGTH TO TRANSITION TO NATIVE GRADE. 2 FT. MINIMUM.
7. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

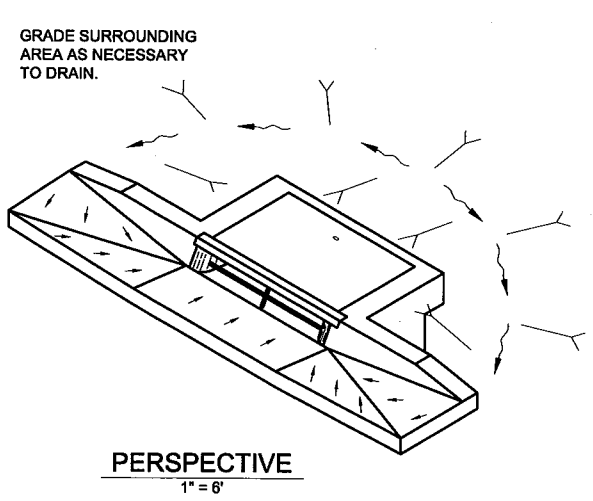
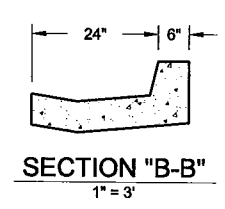
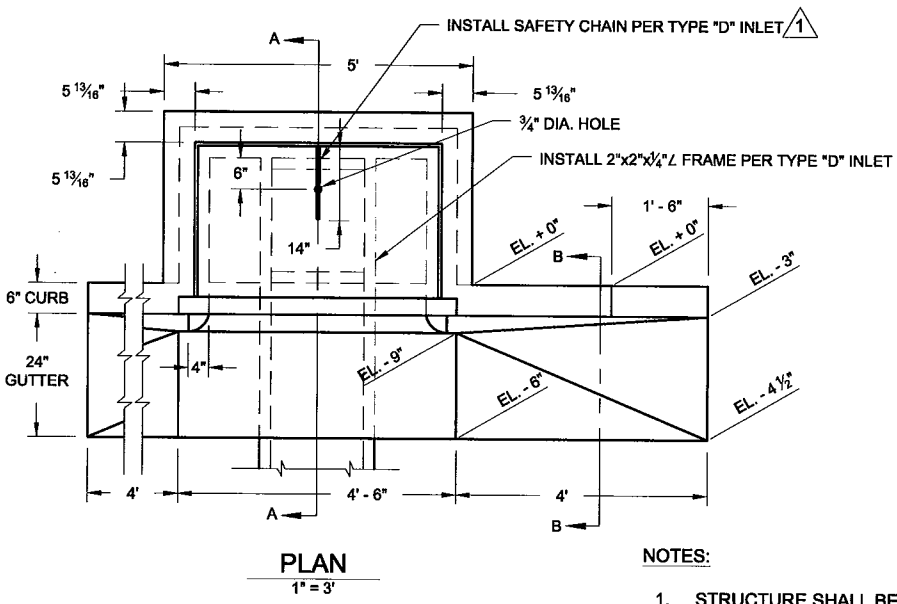
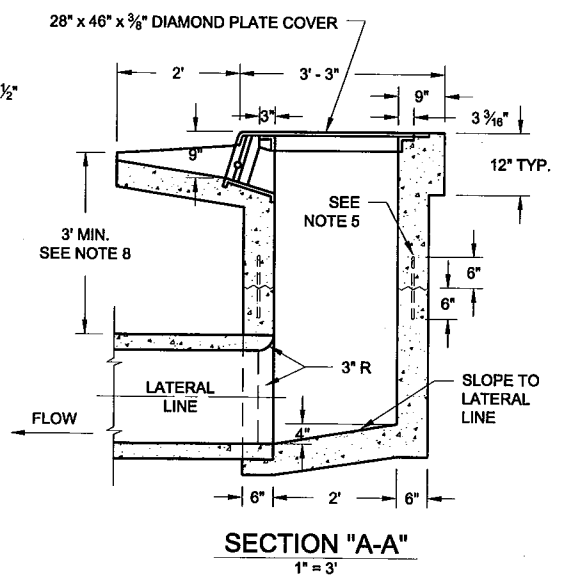
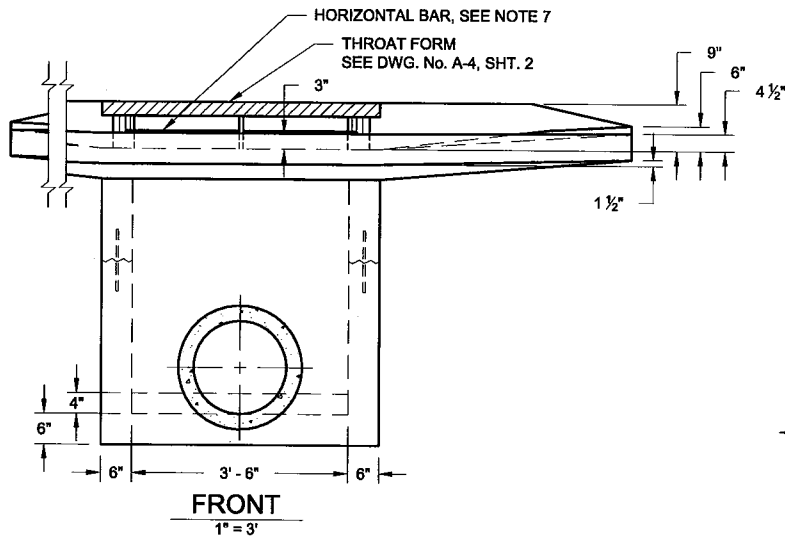
APPROVED BY:

 DISTRICT ENGINEER

DATE: 4-1-11

TYPE "E" INLET
TEMPORARY, WITH CURB FACE OPENING

SCALE: AS SHOWN

DRAWING No. A-7
SHEET 1 OF 1



NOTES:

1. STRUCTURE SHALL BE CLASS "A" CONCRETE. EXPOSED SURFACES SHALL BE FINISHED AS PER CURB SPECIFICATIONS.
2. COST OF FRAME, THROAT FORM, COVER AND 4' CURB & GUTTER WINGS SHALL BE INCLUDED IN PRICE OF INLET.
3. FLOOR OF THE INLET SHALL SLOPE FROM ALL WALLS TO THE LATERAL LINE AND SHALL BE GIVEN A STEEL-TROWELED FINISH.
4. AT THE CONTACT POINT BETWEEN THE LATERAL LINE AND THE INLET WALL A SMOOTH 3" RADIUS CURVE SHALL BE CONSTRUCTED.
5. IF INLET IS CONSTRUCTED IN A TWO STAGE POUR, PROVIDE A ROUGHENED CONSTRUCTION JOINT AND PLACE ONE No. 4 BAR 12" LONG IN EACH OF THE FOUR WALLS AS SHOWN.
6. INLET MAY BE MODIFIED SLIGHTLY TO MATCH EXISTING SURROUNDINGS, AS DIRECTED BY THE ENGINEER.
7. DELETE HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS, OR WHERE EMPLOYED AS AN OUTLET.
8. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.
9. ALL EXPOSED METAL PARTS SHALL BE PAINTED OR DIPPED WITH A BLACK ASPHALTUM PAINT OR OTHER COATING APPROVED BY THE ENGINEER.

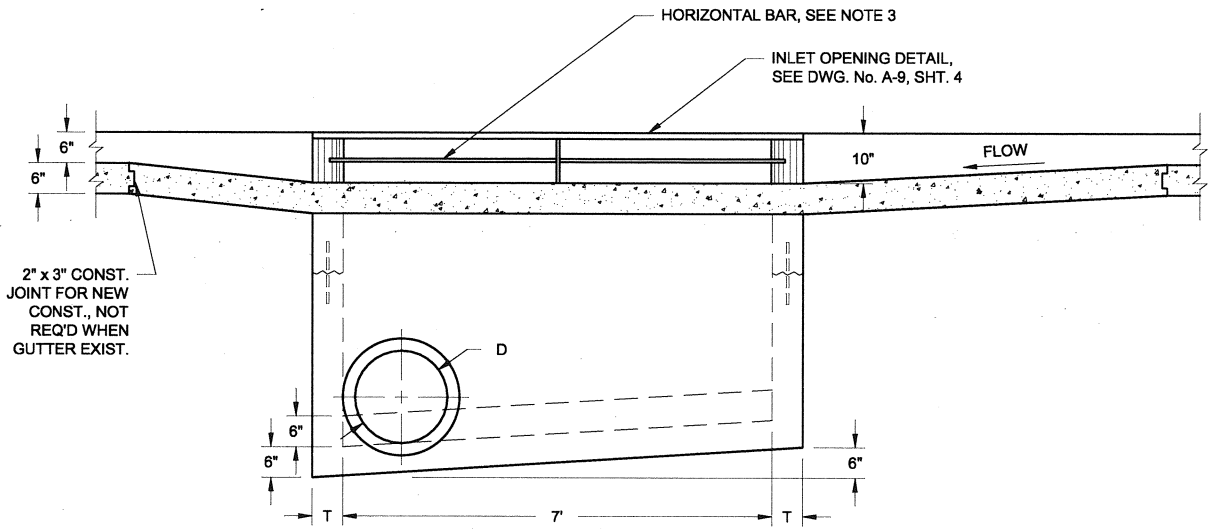
REVISIONS		
MARK	DATE	DESCRIPTION
1	1-1-12	NOTE ADDED
ADOPTED		4/1/2011

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

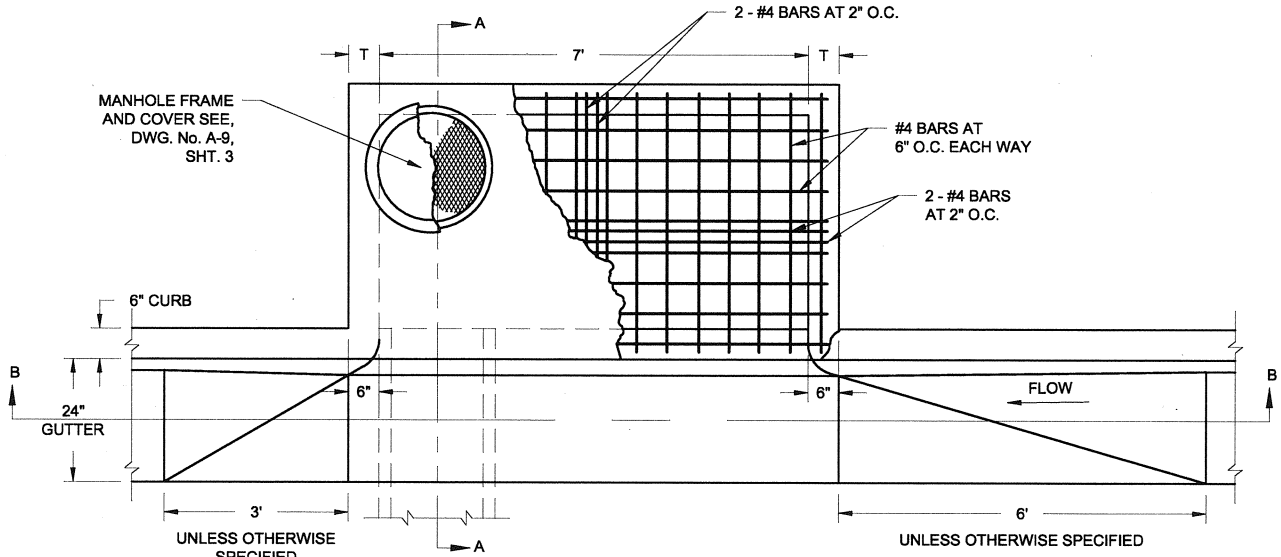
APPROVED BY: *[Signature]* 1-1-12
DISTRICT ENGINEER DATE

TYPE "F" INLET

SCALE AS SHOWN DRAWING No. A-8
SHEET 1 OF 1



SECTION
"B-B"
 1" = 3'



PLAN
 1" = 3'

NOTES:

1. FOR SECTION "A-A" SEE DWG. No. A-9, SHEET 2.
2. FOR "T" AND "D" DIMENSIONS, SEE NOTE 1 ON DWG. No. A-9, SHEET 2.
3. OMIT HORIZONTAL BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

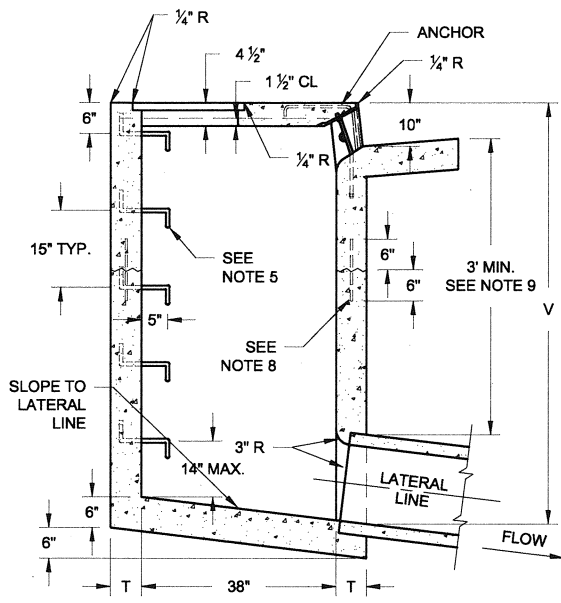
**FRESNO METROPOLITAN
 FLOOD CONTROL DISTRICT**

APPROVED BY: *[Signature]* 4-1-11
 DISTRICT ENGINEER DATE

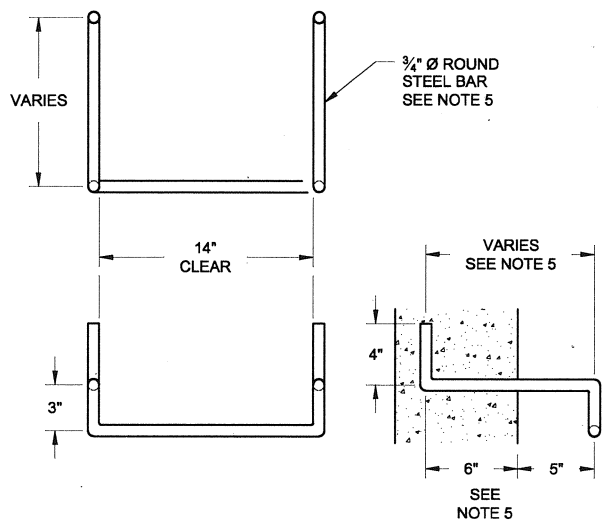
TYPE "G" INLET

SCALE AS SHOWN

DRAWING No. A-9
 SHEET 1 OF 4



SECTION "A-A"
1" = 3'

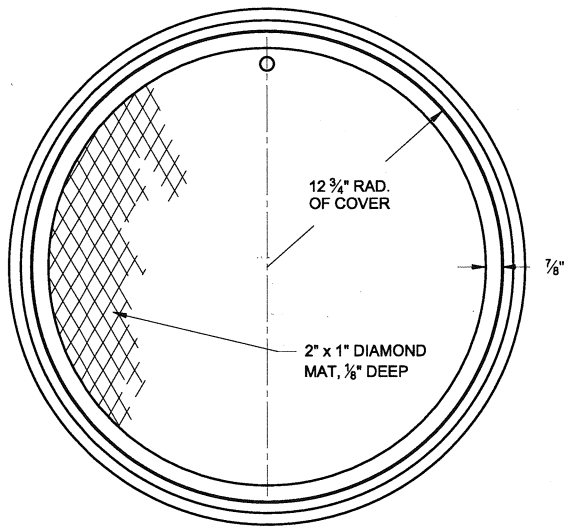


STEP DETAIL
1" = 1'

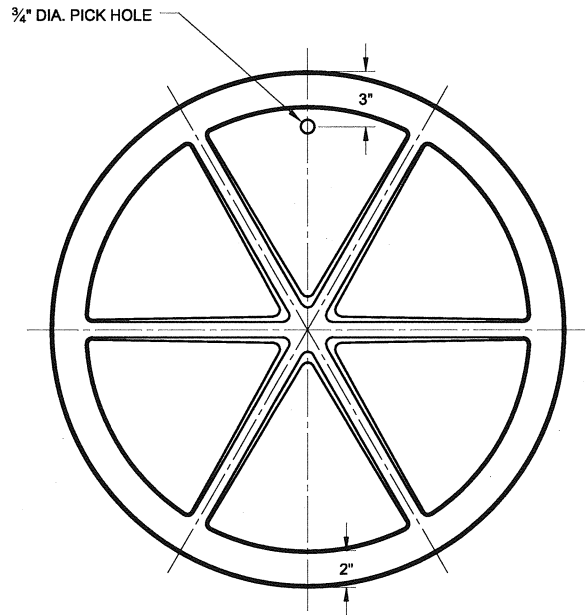
NOTES:

1. DIMENSIONS: UNLESS OTHERWISE SPECIFIED.
V = SHALL BE SHOWN ON THE PLANS.
T = 6 INCHES IF V IS 4 FEET OR LESS.
T = 8 INCHES IF V IS LESS THAN 8 FEET AND MORE THAN 4 FEET.
T = 10 INCHES IF V IS 8 FEET OR MORE.
D = 24 INCHES UNLESS OTHERWISE SPECIFIED.
2. STRUCTURAL CONCRETE SHALL BE CLASS "A" P.C.C. (6.0 SACK).
3. THE REINFORCING STEEL SHALL BE NUMBER 4 DEFORMED BARS.
CLEARANCE SHALL BE 1 1/2 INCHES FROM THE BOTTOM OF THE SLAB.
4. THE SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM TO SLOPE, GRADE, COLOR, FINISH, AND SCORING IN THE EXISTING OR PROPOSED CURB AND WALK ADJACENT TO THE INLET. THE INLET FLOOR SHALL BE GIVEN A TIGHT WOOD FLOAT FINISH. CURVATURE OF THE LIP AND SIDEWALLS AT THE GUTTER OPENING SHALL NOT BE MADE BY PLASTERING. THE OUTLET PIPE SHALL BE TRIMMED TO FINAL SHAPE AND LENGTH BEFORE THE CONCRETE IS POURED.
5. STEPS SHALL BE INSTALLED WHEN V EXCEEDS 4 FEET 6 INCHES. STEPS SHALL BE 5 INCHES CLEAR FROM THE WALL AT THE ENDS AND SPACED 15 INCHES APART O.C. ONLY ONE STEP 12 INCHES FROM THE BOTTOM SHALL BE INSTALLED IF V IS 4 FEET 6 INCHES OR LESS. MINIMUM EMBEDMENT FOR T = 8" AND T = 10" SHALL BE 6". FOR T = 6", APPROVED ANCHORING DEVICES SHALL BE USED WHICH PROVIDE A MINIMUM 3" EMBEDMENT AND MEET DESIGN LOAD REQ'MTS OF SECTION 3277 (C) OF TITLE 8, CALIFORNIA CODE OF REGULATIONS. THE MINIMUM DESIGN LOAD SHALL BE A SINGLE CONCENTRATED LOAD OF 300 LBS. STEPS SHALL BE 3/4" Ø ROUND STEEL CONFORMING TO ASTM A108-07, BENT HOT, AND SHALL BE HOT-DIP GALVANIZED PER ASTM A123/R123 M-09, AND SLIP RESISTANT.
6. CURB, GUTTER AND LOCAL DEPRESSIONS SHALL BE CLASS "A" OR CLASS "B" CONCRETE.
7. CURB AND GUTTER SHALL BE CONSTRUCTED OR RECONSTRUCTED ON EACH SIDE OF BOX AS INDICATED ON THE PLANS, AND COST THEREOF SHALL BE INCLUDED IN PRICE OF INLET.
8. IF INLET IS CONSTRUCTED IN A TWO STAGE POUR, PROVIDE A ROUGHENED CONSTRUCTION JOINT AND PLACE ONE NUMBER 4 BAR 12 INCHES LONG IN EACH OF THE FOUR WALLS, AS SHOWN.
9. PIPE MINIMUM DEPTH MAY BE ADJUSTED BY THE DESIGNER OR ENGINEER. MAY REQUIRE PIPE CLASS CHANGE OR SPECIAL BACKFILL.

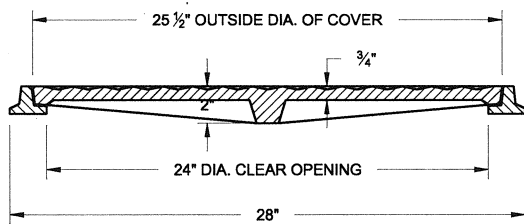
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT		TYPE "G" INLET	
MARK	DATE	DESCRIPTION	APPROVED BY:	SCALE	DRAWING No.	
				AS SHOWN	A-9	
						DATE
ADOPTED		4/1/2011	9-1-11	2 OF 4		



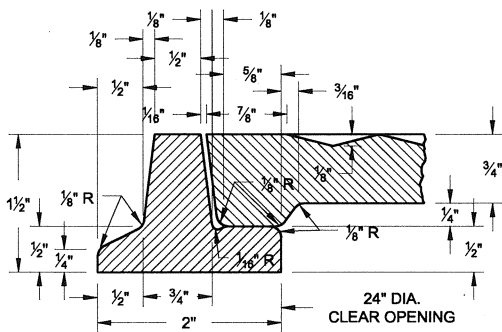
TOP OF MANHOLE FRAME & COVER
(TOTAL WT. = 130 LBS.)
1" = 10"



BOTTOM OF MANHOLE COVER
1" = 10"



CROSS SECTION THRU FRAME & COVER
1" = 10"

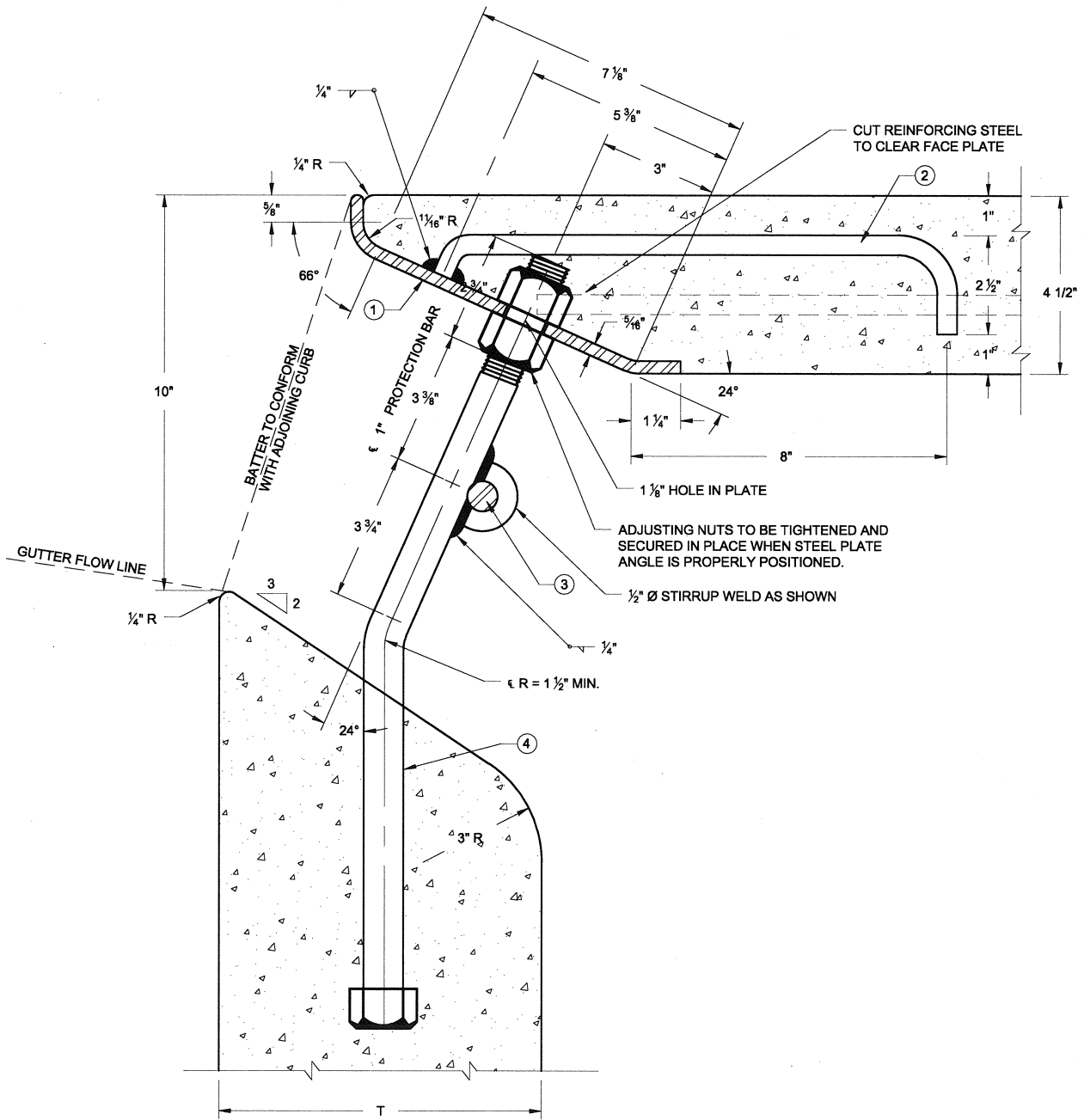


CROSS SECTION THRU RIM
1" = 2"

NOTES:

1. FRAME AND COVER SHALL BE GRAY CAST IRON CONFORMING TO THE LATEST A.S.T.M. DESIGNATION A 48, CLASS 30 OR BETTER, GALVANIZED PER A.S.T.M. A385.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	MANHOLE FRAME & COVER FOR TYPE "G" INLET	
MARK	DATE	DESCRIPTION			
			APPROVED BY:	SCALE AS SHOWN	DRAWING No. A-9 SHEET 3 OF 4
ADOPTED	4/1/2011		<i>[Signature]</i> DISTRICT ENGINEER	4-1-11 DATE	




NOTES:

- ① FACE PLATE 5/16" x 10" ROLLED PLATE (ASTM A36) FORMED AS SHOWN.
- ② FACE PLATE ANCHORAGE 1/2" Ø STEEL ANCHOR 42" O.C. MAX. PLACED AS SHOWN.
- ③ HORIZONTAL PROTECTION BAR PLAIN ROUND STEEL BAR 1" DIA. SHALL BE INSTALLED. BAR SHALL BE EMBEDDED 5 INCHES AT EACH END. OMIT BAR WHERE SHOWN ON THE PROJECT PLANS OR SPECIFIED IN THE PROJECT SPECIAL PROVISIONS.
- ④ SUPPORT BAR 1" DIA. x 20" LONG WITH SQ. HEAD AND HEX. NUTS. BEND AS SHOWN AND PLACE AT CENTER OF INLET OPENING.
- 5. ALL EXPOSED METAL PARTS SHALL BE GALVANIZED.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

 DISTRICT ENGINEER

4-1-11
 DATE

**DETAIL OF TYPE "G"
INLET OPENING**

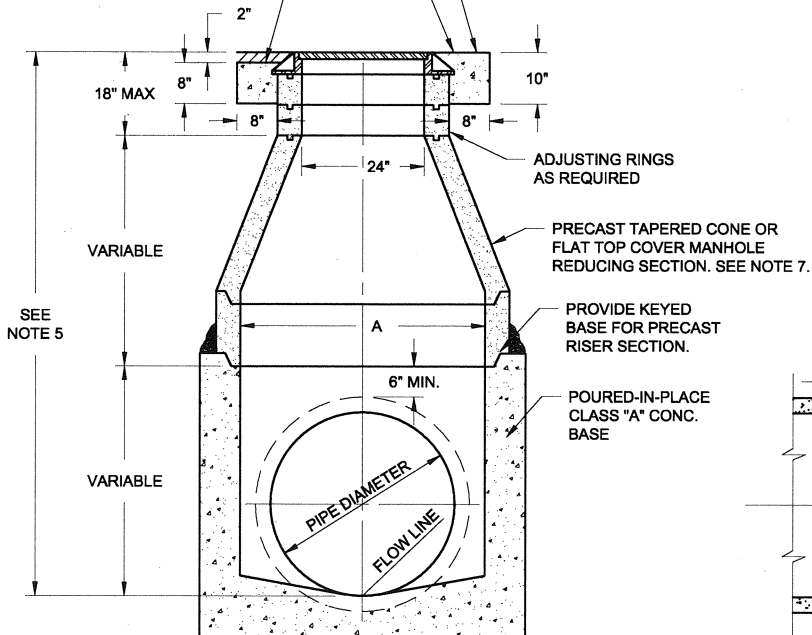
SCALE AS SHOWN

DRAWING No. A-9
 SHEET 4 OF 4

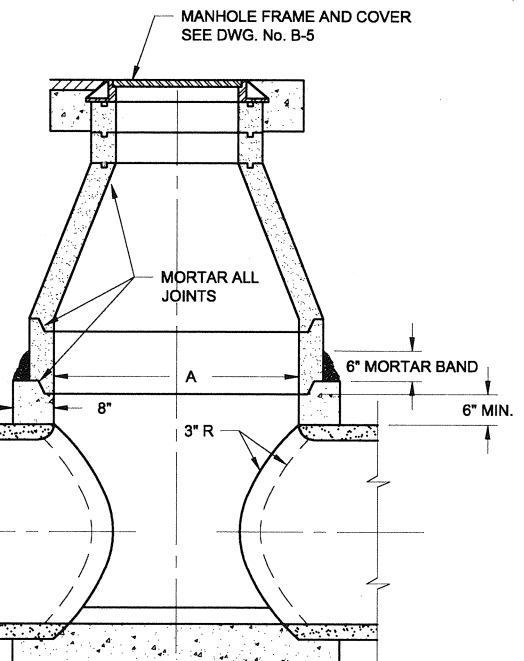
CONC. COLLAR 2" BELOW COVER, 2" A.C. FLUSH WITH COVER IN A.C. PAVED INSTALLATIONS.

CONC. COLLAR FLUSH WITH COVER FOR CONC. PAVEMENT INSTALLATIONS.

POURED-IN-PLACE CONC. COLLAR, FULL CIRCUMFERENCE. CLASS "A" CONCRETE.



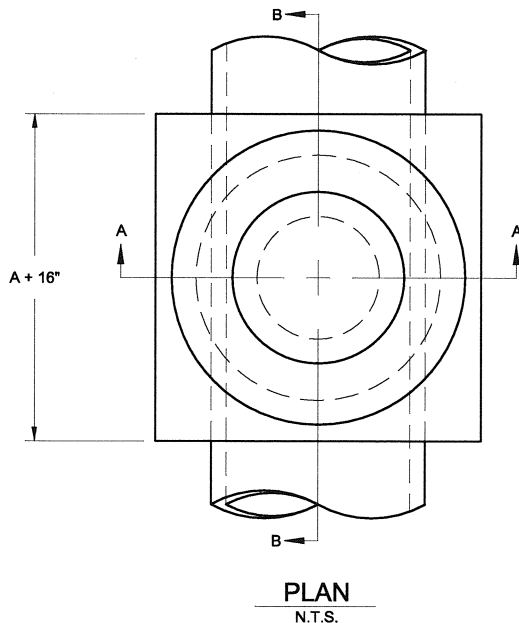
SECTION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.

STANDARD MANHOLE

CASE I	A = 48"
CASE II	A = 60"
CASE III	A = 72"

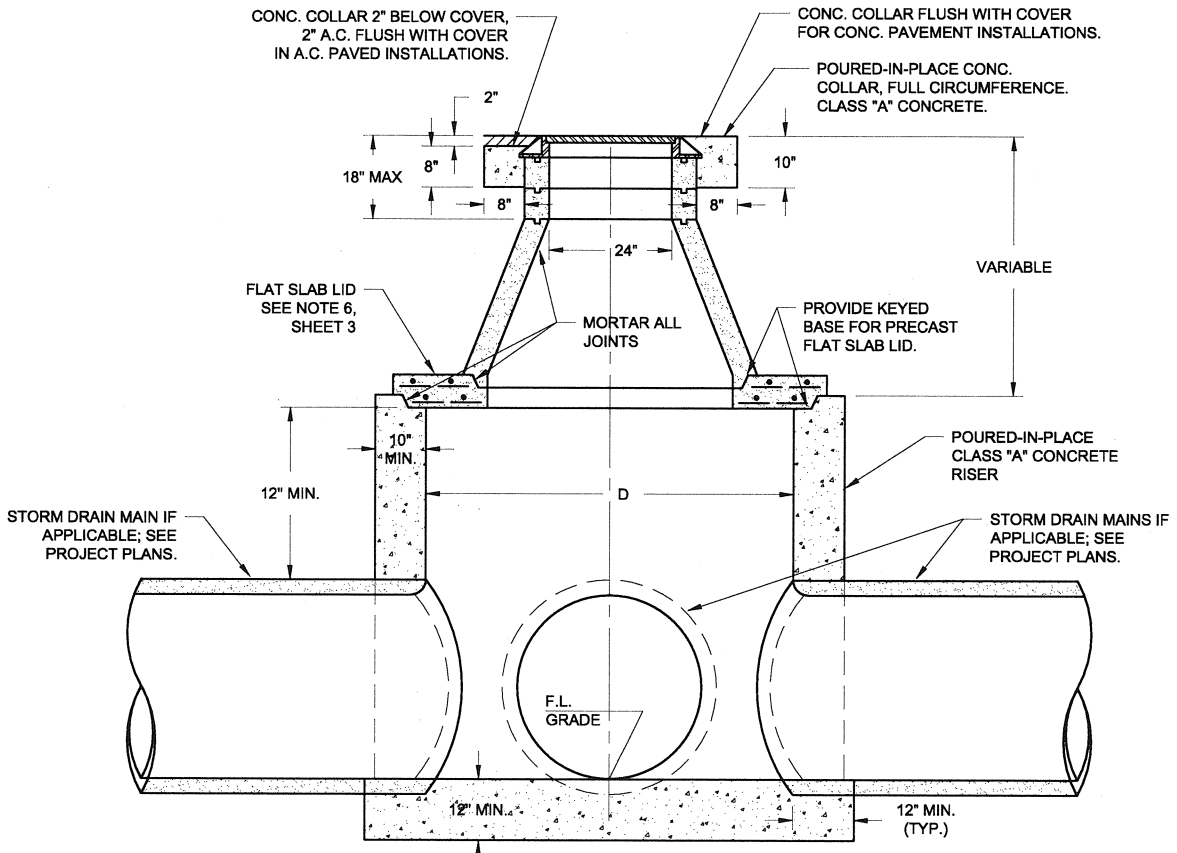


PLAN
N.T.S.

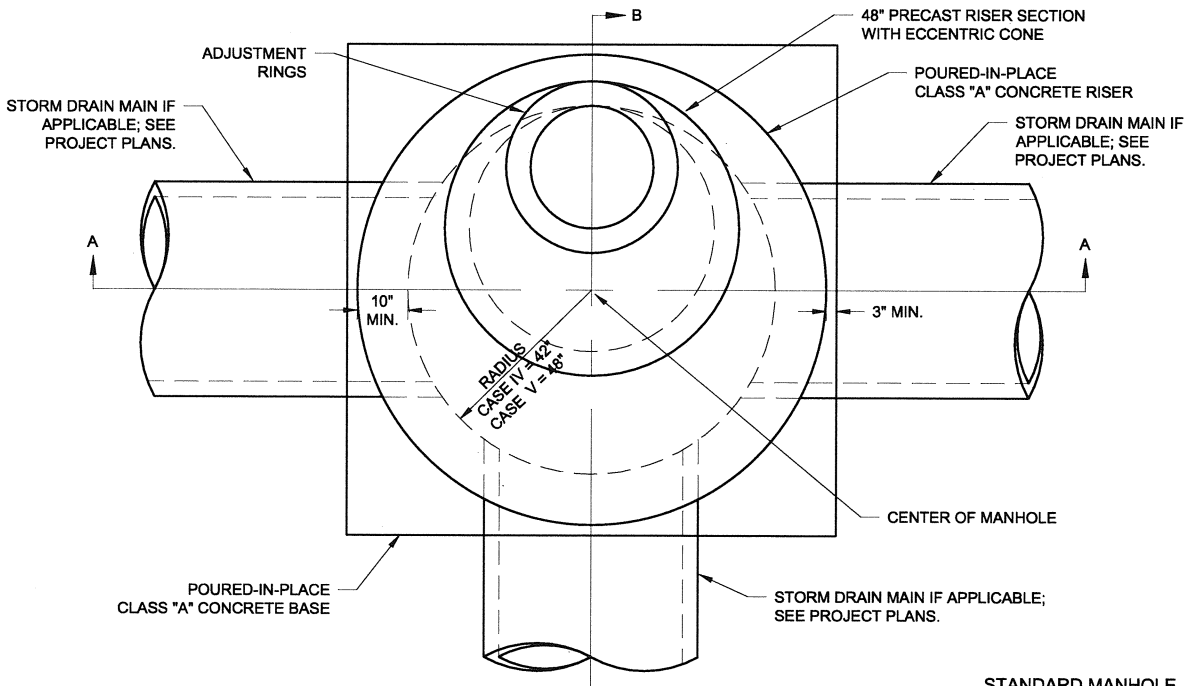
NOTES:

1. PRECAST PIPE, ADJUSTING RINGS AND TAPERED OR FLAT TOP SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH A.S.T.M. C-478, USING TYPE II CEMENT.
2. THE JOINT BETWEEN THE PRECAST RISER AND POURED-IN-PLACE CONCRETE RISER AND BASE, AND ALL JOINTS BETWEEN PRECAST SECTIONS INCLUDING GRADE RINGS SHALL BE MORTARED.
3. PROVIDE 6" MORTAR BAND AROUND EXTERIOR OF RISER-TO-BASE JOINT.
4. INTERIOR OF THE MANHOLE SHALL HAVE A SMOOTH TROWELED SURFACE.
5. IF THE DISTANCE BETWEEN THE FLOW LINE OF THE MANHOLE AND THE FINISH GRADE OF THE LID IS GREATER THAN OR EQUAL TO 12 FEET, THE MANHOLE IS TO BE CONSTRUCTED WITH STEPS, AS SHOWN ON DRAWING No. B-4.
6. MANHOLES SHALL BE CONSTRUCTED PER SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.
7. WHERE GATE VALVE OR STEPS ARE SHOWN ON THE PLANS TO BE INSTALLED, USE ECCENTRIC REDUCING SECTION PER DRAWING No. B-4 OR G-5, SHT 2.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TYPE "A" MANHOLE CASE I, II & III	
MARK	DATE	DESCRIPTION		SCALE AS SHOWN	DRAWING No. <u>B-1</u> SHEET <u>1</u> OF <u>3</u>
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER	4-1-11 DATE	



SECTION "A-A"
N.T.S.



PLAN
N.T.S.

STANDARD MANHOLE
CASE IV D = 84"
CASE V D = 96"

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

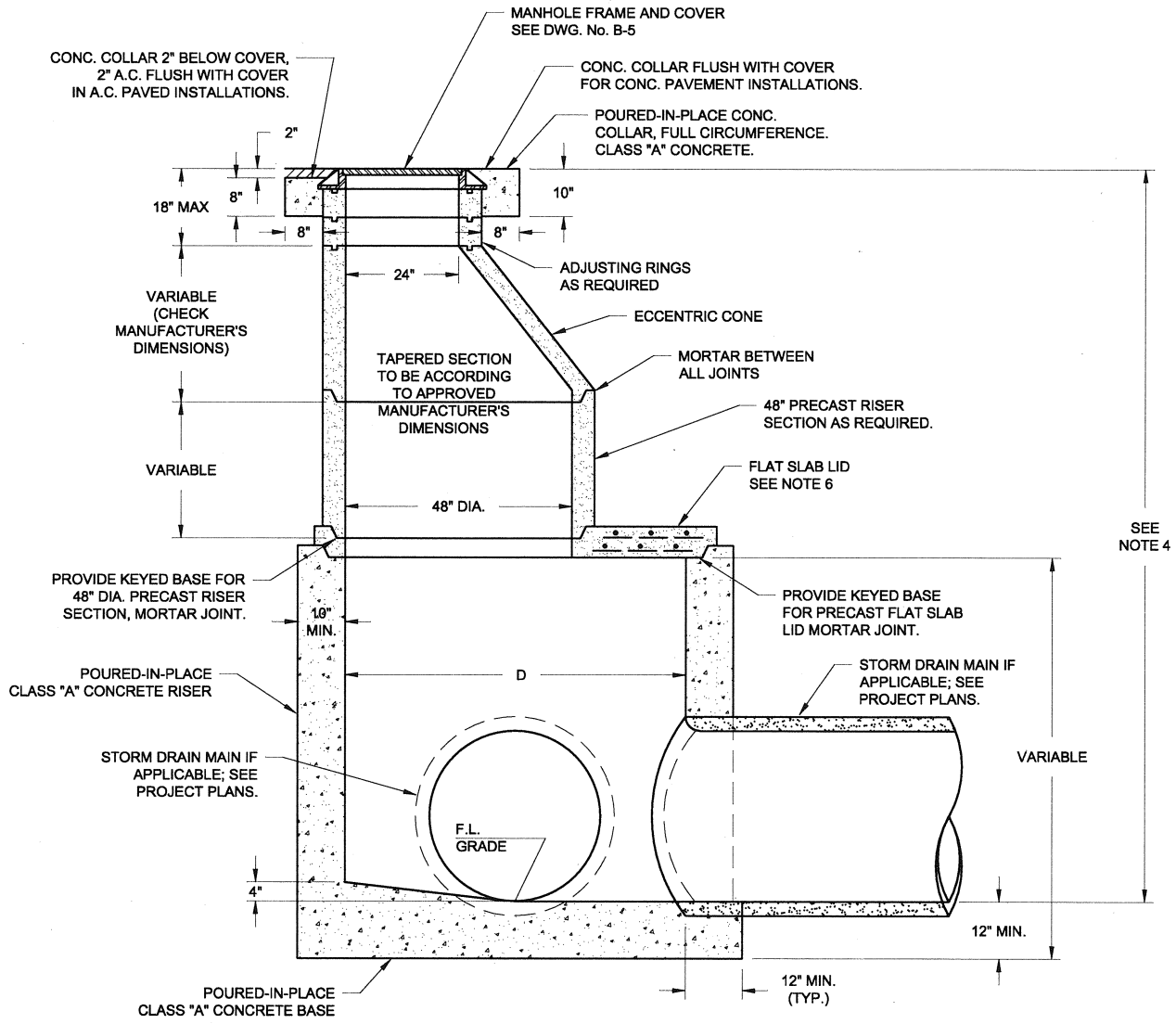
APPROVED BY:
[Signature]
DISTRICT ENGINEER

4-1-11
DATE

**TYPE "A" MANHOLE
CASE IV & V**

SCALE AS SHOWN

DRAWING No. B-1
SHEET 2 OF 3



SECTION "B-B"
N.T.S.

NOTES:

1. PRECAST PIPE, ADJUSTING RINGS AND FLAT SLAB LIDS SHALL BE CONSTRUCTED IN ACCORDANCE WITH A.S.T.M. C-478, USING TYPE II CEMENT.
2. ALL JOINTS SHALL BE MORTARED.
3. INTERIOR OF THE MANHOLE SHALL HAVE A SMOOTH TROWLED SURFACE.
4. IF THE DISTANCE BETWEEN THE FLOW LINE OF THE MANHOLE AND THE FINISH GRADE OF THE LID IS GREATER THAN OR EQUAL TO 12 FEET, THE MANHOLE IS TO BE CONSTRUCTED, WITH STEPS, AS SHOWN ON F.M.F.C.D. STD. DWG. No. B-4 (FOR TYPE "A" MANHOLES.)
5. MANHOLES SHALL BE CONSTRUCTED PER SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.
6. FLAT SLAB LIDS SHALL BE DESIGNED FOR HS20-44 LOADING. CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
7. CONTRACTOR SHALL EMPLOY ALL MEASURES NECESSARY TO ENSURE THAT THE MINIMUM COMPACTION REQUIREMENTS ARE MET FOR ALL BACKFILL ASSOCIATED WITH THE MANHOLE CONSTRUCTION.

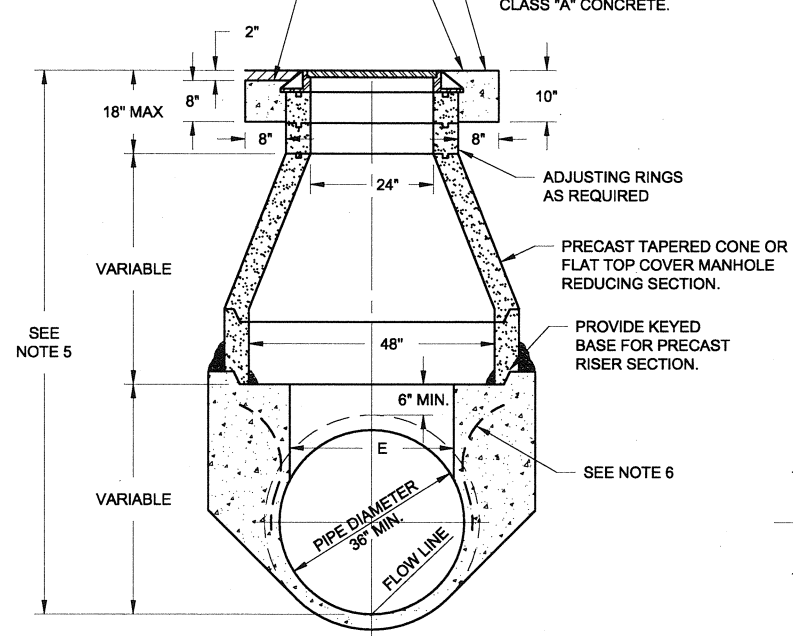
STANDARD MANHOLE
CASE IV D = 84"
CASE V D = 96"

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TYPE "A" MANHOLE CASE IV & V	
MARK	DATE	DESCRIPTION		SCALE AS SHOWN	DRAWING No. <u>B-1</u> SHEET <u>3</u> OF <u>3</u>
ADOPTED	4/1/2011		APPROVED BY: DISTRICT ENGINEER		
			DATE 4-7-11		

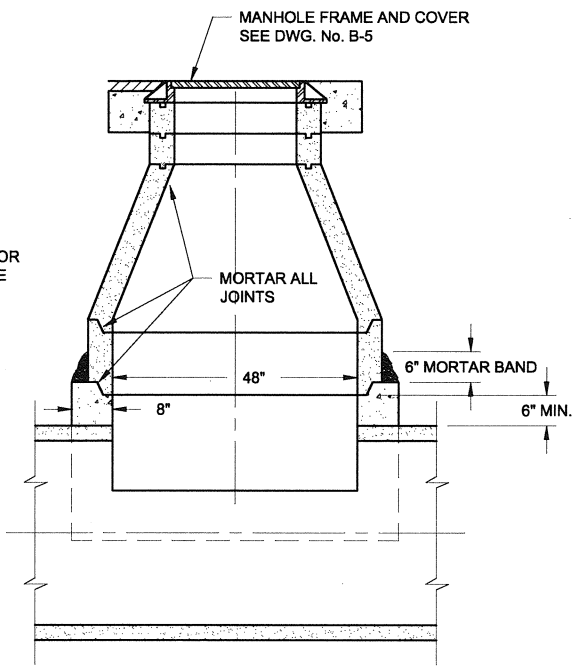
CONC. COLLAR 2" BELOW COVER, 2" A.C. FLUSH WITH COVER IN A.C. PAVED INSTALLATIONS.

CONC. COLLAR FLUSH WITH COVER FOR CONC. PAVEMENT INSTALLATIONS.

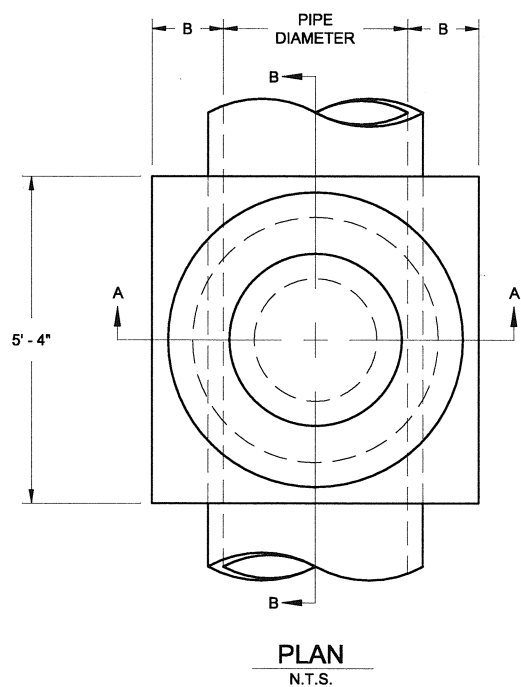
POURED-IN-PLACE CONC. COLLAR, FULL CIRCUMFERENCE, CLASS "A" CONCRETE.



SECTION "A-A"
N.T.S.



SECTION "B-B"
N.T.S.



PLAN
N.T.S.

DIMENSIONS					
PIPE DIA.	IN.	36	42	48	54 AND GREATER
B	IN.	14	11	8	EQUALS PIPE WALL THICKNESS
E	IN.	32	38	44	48

NOTES:

1. PRECAST PIPE, ADJUSTING RINGS AND TAPERED OR FLAT TOP SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH A.S.T.M. C-478, USING TYPE II CEMENT.
2. THE JOINT BETWEEN THE PRECAST RISER AND CONCRETE BASE, AND ALL JOINTS BETWEEN PRECAST SECTIONS INCLUDING GRADE RINGS SHALL BE MORTARED.
3. PROVIDE 6" MORTAR BAND AROUND EXTERIOR OF RISER-TO-BASE JOINT.
4. INTERIOR OF THE MANHOLE SHALL HAVE A SMOOTH TROWELED SURFACE.
5. IF THE DISTANCE BETWEEN THE FLOW LINE OF THE MANHOLE AND THE FINISH GRADE OF THE LID IS GREATER THAN OR EQUAL TO 12 FEET, THE MANHOLE IS TO BE CONSTRUCTED WITH STEPS, AS SHOWN ON DRAWING No. B-4.
6. FOR REINFORCED CONCRETE PIPES, CUT AND BEND STEEL REINFORCEMENT INTO CAST-IN-PLACE MANHOLE BASE.
7. MANHOLES SHALL BE CONSTRUCTED PER SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

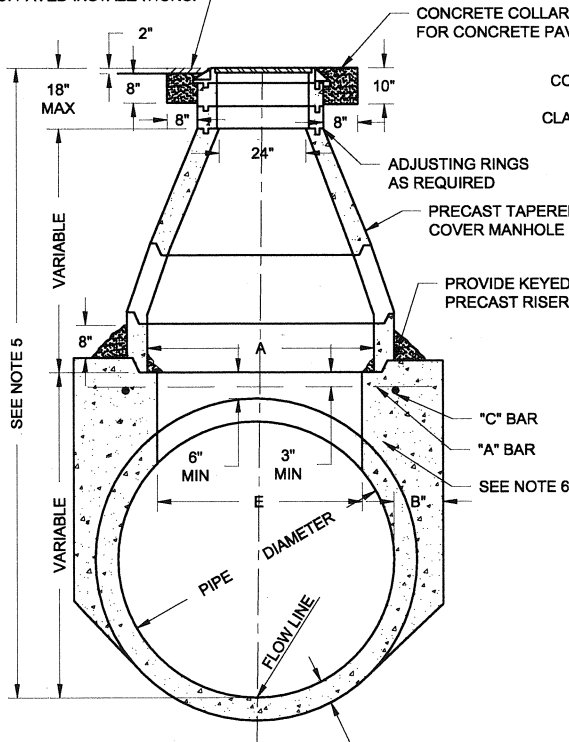
APPROVED BY:
[Signature] 4-1-11
DISTRICT ENGINEER DATE

TYPE "B" MANHOLE

SCALE AS SHOWN

DRAWING No. B-2
SHEET 1 OF 1

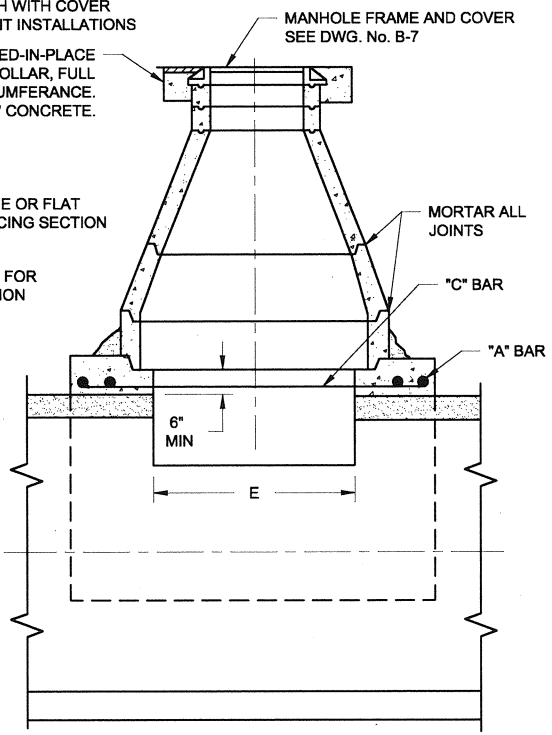
CONCRETE COLLAR 2" BELOW COVER; 2" A.C. FLUSH WITH COVER. IN A.C. PAVED INSTALLATIONS.



SECTION "A-A"
N.T.S.

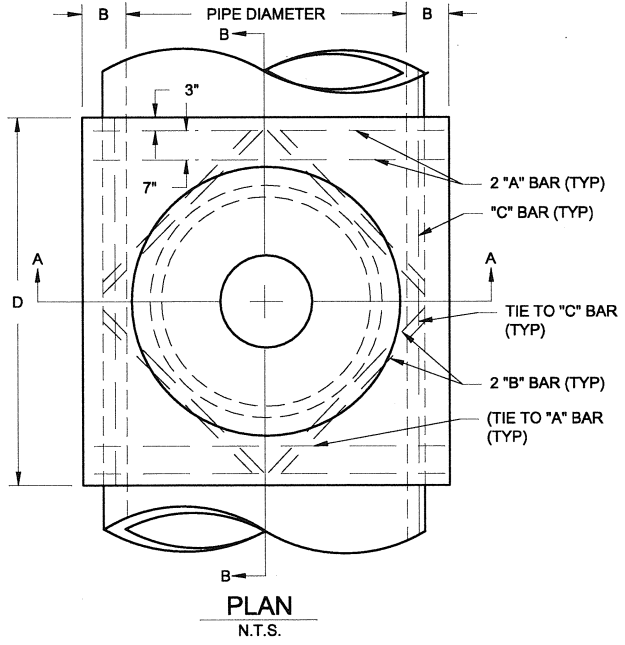
CONCRETE COLLAR FLUSH WITH COVER FOR CONCRETE PAVEMENT INSTALLATIONS

POURED-IN-PLACE CONC. COLLAR, FULL CIRCUMFERENCE. CLASS "A" CONCRETE.



SECTION "B-B"
N.T.S.

C - FOR CAST-IN-PLACE PIPE ONLY. REINFORCED CONCRETE PIPE USE STANDARD WALL THICKNESS



PLAN
N.T.S.

PIPE DIAM	DIMENSIONS					REINFORCEMENT					
	A	B	C	D	E	BAR "A"	BAR "B"	BAR "C"			
IN.	IN.	IN.	IN.	FT.	IN.	#	L.	#	L.	#	L.
60	60	10	6	7	54	5	6'-5"	5	2'-6"	5	6'-6"
66	60	10	-	7	54	5	7'-0"	5	3'-0"	5	7'-0"
72	60	12	7	8	54	5	7'-6"	5	4'-0"	5	7'-6"
84	72	12	-	9	66	6	8'-6"	6	6'-0"	6	8'-6"

NOTES:

1. PRECAST RISERS, ADJUSTING RINGS, AND TAPERED SECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH A.S.T.M. C-478, USING TYPE II CEMENT.
2. THE JOINT BETWEEN THE PRECAST RISER AND CONCRETE BASE, AND ALL JOINTS BETWEEN PRECAST SECTIONS INCLUDING GRADE RINGS SHALL BE MORTARED.
3. PROVIDE 8" MORTAR BAND AROUND EXTERIOR OF RISER-TO-BASE JOINT.
4. INTERIOR OF THE MANHOLE SHALL HAVE A SMOOTH TROWELED SURFACE.
5. IF THE DISTANCE BETWEEN THE FLOW LINE OF THE MANHOLE AND THE FINISH GRADE OF THE LID IS GREATER THAN OR EQUAL TO 12 FEET, THE MANHOLE IS TO BE CONSTRUCTED, WITH STEPS, AS SHOWN ON DRAWING No. B-4.
6. FOR REINFORCED CONCRETE PIPES, CUT AND BEND STEEL REINFORCEMENT INTO CAST-IN-PLACE MANHOLE BASE.
7. MANHOLES SHALL BE CONSTRUCTED PER SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

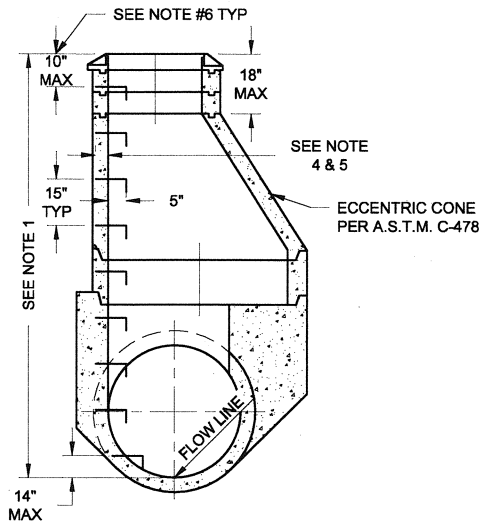
APPROVED BY:
[Signature]
DISTRICT ENGINEER

4-1-11
DATE

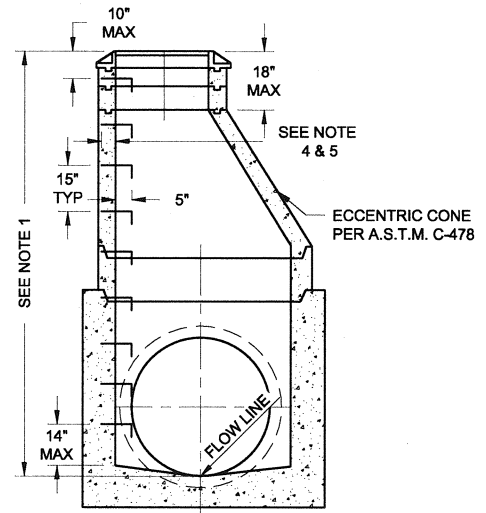
TYPE "C" MANHOLE

SCALE AS SHOWN

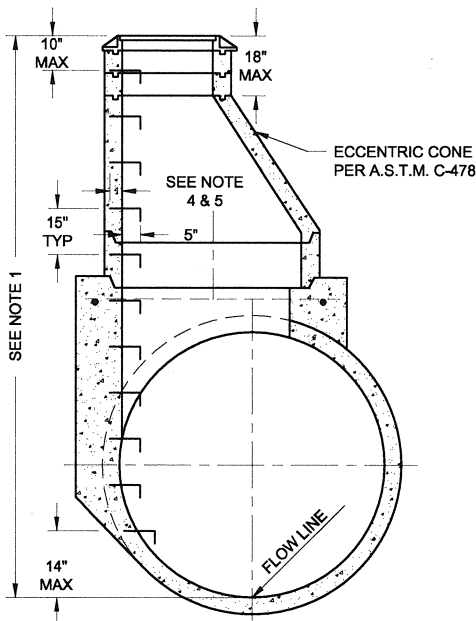
DRAWING No. B-3
SHEET 1 OF 1



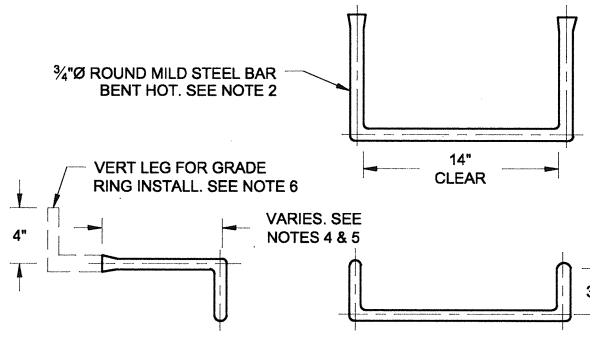
TYPE "B" MANHOLE
N.T.S.



TYPE "A" MANHOLE
N.T.S.



TYPE "C" MANHOLE
N.T.S.

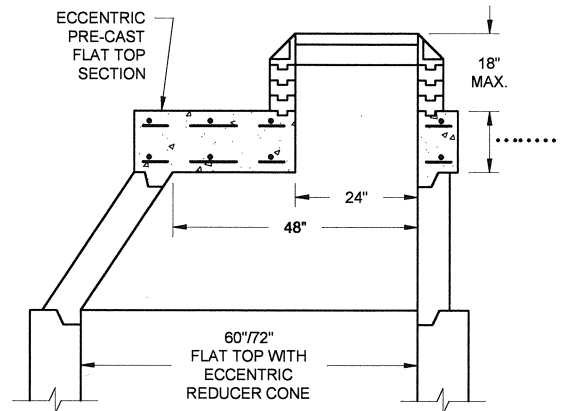
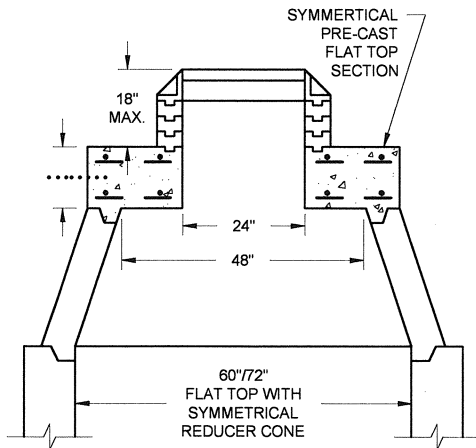
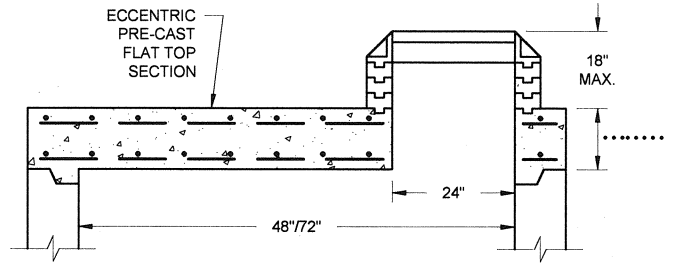
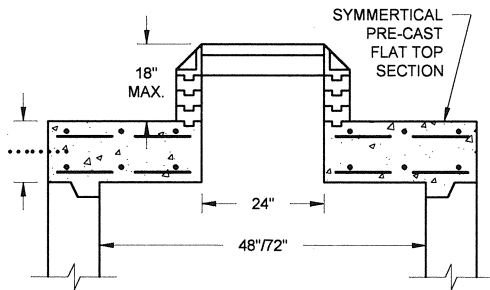
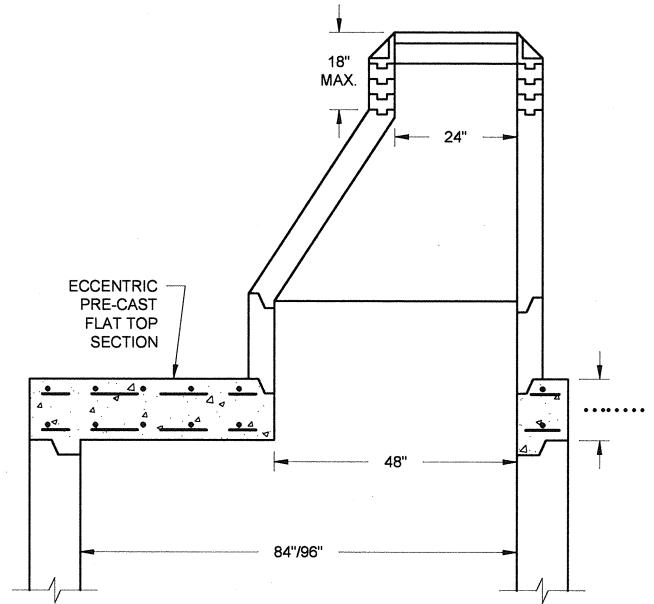
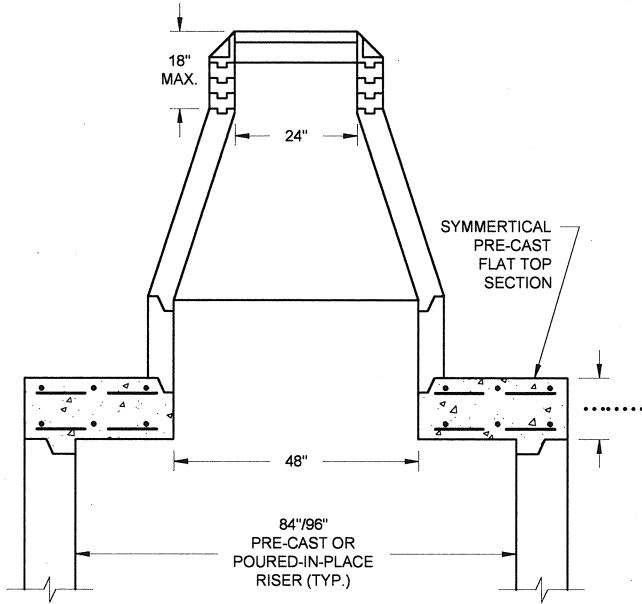


STEP DETAIL
1" = 1'

NOTES:

1. USE MANHOLE WITH STEPS WHEN DISTANCE BETWEEN FINISH SURFACE AND FLOWLINE IS 12 FEET OR GREATER.
2. STEEL BAR FOR STEPS SHALL CONFORM TO A.S.T.M. A 108-07 AND GALVANIZED PER A.S.T.M. A 123/A 123M-09 AFTER HOT BENDING. OTHER CORROSION-PROOFING COATINGS MAY BE APPROVED BY THE ENGINEER.
3. STEPS SHALL BE SLIP RESISTANT, USING AN APPROVED COATING, ETCHING, GROOVING, OR OTHER METHOD APPROVED BY THE ENGINEER.
4. MINIMUM STEP IMBEDMENT SHALL BE 6 INCHES, FIRMLY AND RIGIDLY SET WITH EPOXY GROUT OR EPOXY. EXCEPTION: SEE NOTE 5.
5. WHERE THE WALL THICKNESS OF ANY ELEMENT OF THE MANHOLE WILL NOT PERMIT AT LEAST 6 INCHES OF STEP IMBEDMENT, APPROVED ANCHORING DEVICES SHALL BE USED WHICH PROVIDE A MINIMUM 3 INCHES IMBEDMENT AND MEET THE MINIMUM DESIGN LOAD REQUIREMENTS OF SECTION 3277(C) OF TITLE 8, CALIFORNIA CODE OF REGULATIONS. THE MINIMUM DESIGN LOAD SHALL BE A SINGLE CONCENTRATED LOAD OF 300 LBS.
6. WHERE STEP IS LOCATED WITHIN GRADE RING AREA, USE GRADE RINGS GROOVED FOR STEP PLACEMENT BETWEEN RINGS. STEP SHALL HAVE VERTICAL ANCHOR LEGS BEHIND THE RING.
7. ORIENT MANHOLE SO THAT STEPS ARE IN THE WALL WITHOUT PIPES, OR WALL WITH LEAST DIAMETER PIPE. MAINTAIN CONTINUOUS VERTICAL STEP ALIGNMENT.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TYPES A, B, C MANHOLE WITH STEPS	
MARK	DATE	DESCRIPTION		SCALE	DRAWING No.
				AS SHOWN	B-4
ADOPTED		4/1/2011	APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER		DATE 4-1-11
			SCALE AS SHOWN		DRAWING No. <u>B-4</u> SHEET <u>1</u> OF <u>1</u>

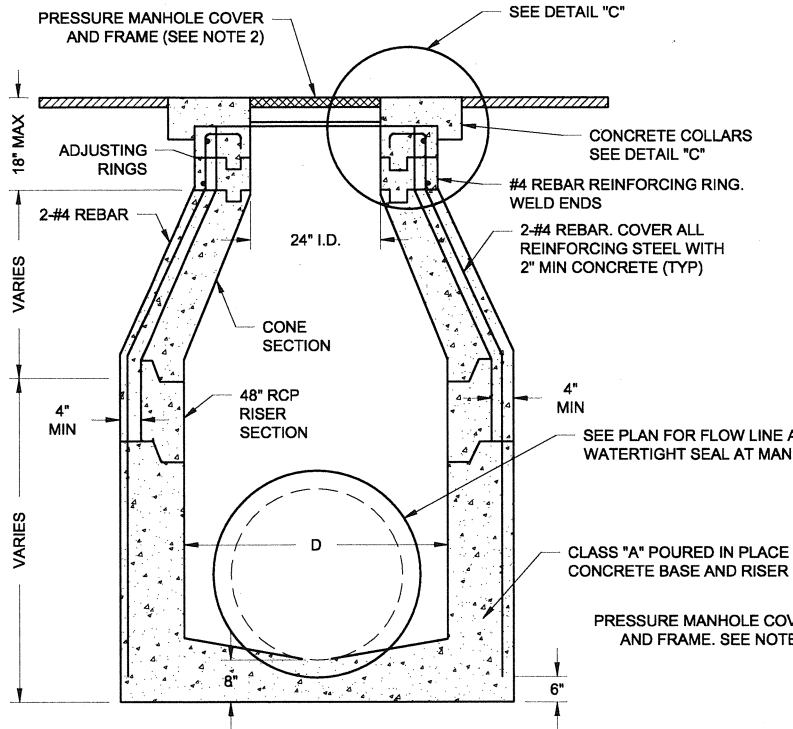


NOTES :

1. FLAT TOP LIDS SHALL BE DESIGNED FOR HS20-44 LOADING. A CERTIFICATE FROM THE SUPPLIER SHALL BE FURNISHED, OR CALCULATIONS FROM THE CONTRACTOR'S ENGINEER SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION.
2. PRECAST RISERS, ADJUSTING RINGS AND FLAT TOP LIDS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478, USING TYPE II CEMENT.
3. DRAWINGS ARE SCHEMATIC ONLY. CONSTRUCTION OF MANHOLES SHALL COMPLY WITH THE REQUIREMENTS OF THE STANDARD DRAWINGS FOR THE PARTICULAR TYPE OF MANHOLE BEING CONSTRUCTED, AND WITH SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	MANHOLE FLAT TOP LID APPLICATIONS	
MARK	DATE	DESCRIPTION			
			APPROVED BY: <i>Jerry Thomas</i> DISTRICT ENGINEER	SCALE: NOT TO SCALE	DRAWING No. B-5 SHEET 1 OF 1
ADOPTED	4/1/2011				

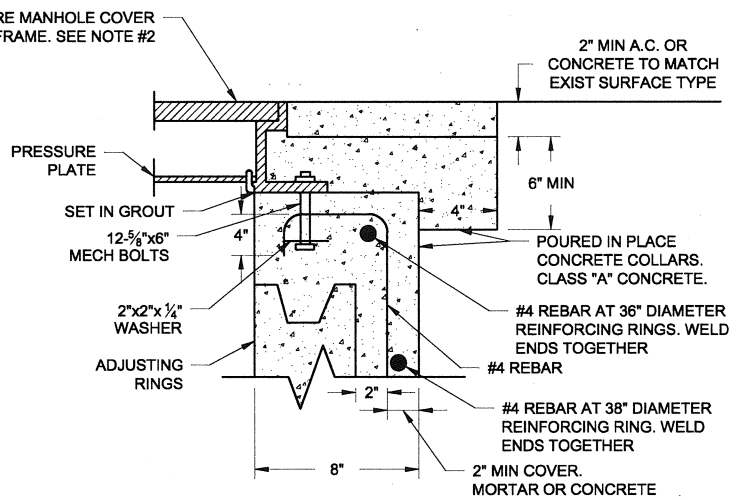
- NOTES:**
1. PRECAST PIPE RISER SECTIONS, TAPERED CONES, AND ADJUSTING RINGS SHALL CONFORM TO A.S.T.M. C-478, USING TYPE 2 CEMENT. ELLIPTICAL SINGLE LINE REINFORCEMENT NOT PERMITTED.
 2. PRESSURE MANHOLE COVER AND FRAME SHALL BE ALHAMBRA MODEL A-1500 OR APPROVED EQUAL.
 3. JOINTS BETWEEN ALL PRECAST RISERS AND GRADE RINGS, AND THE JOINT BETWEEN THE PRECAST RISER AND POURED-IN-PLACE CONCRETE BASE/RISER SHALL BE MORTARED.
 4. MANHOLES SHALL BE CONSTRUCTED PER SECTION 23 OF THE FMFCD STANDARD SPECIFICATIONS.



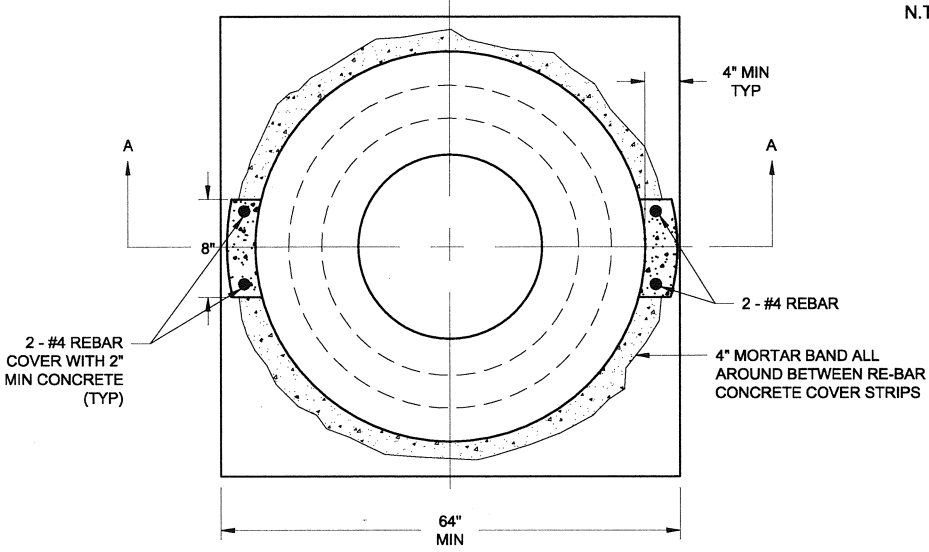
SECTION "A-A"
N.T.S.

DIAMETER "D"

TYPE 1	D = 48"
TYPE 2	D = 60"
TYPE 3	D = 72"



DETAIL "C"
N.T.S.



REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

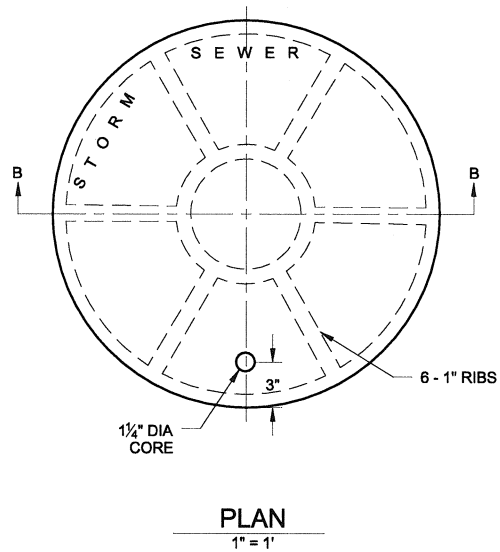
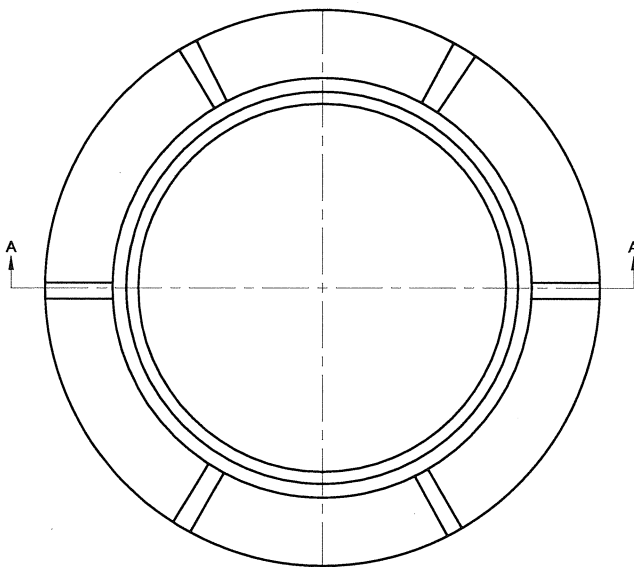
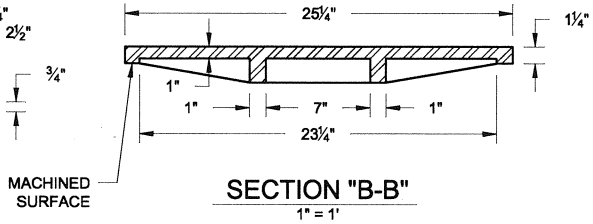
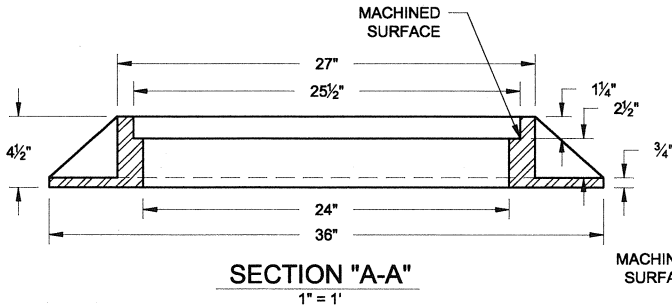
FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

LOW PRESSURE MANHOLE
TYPE I, II, & III

SCALE AS SHOWN

DRAWING No. B-6
SHEET 1 OF 1



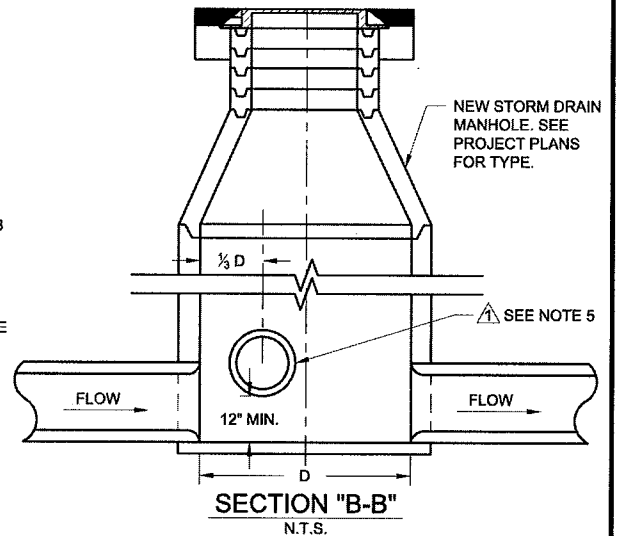
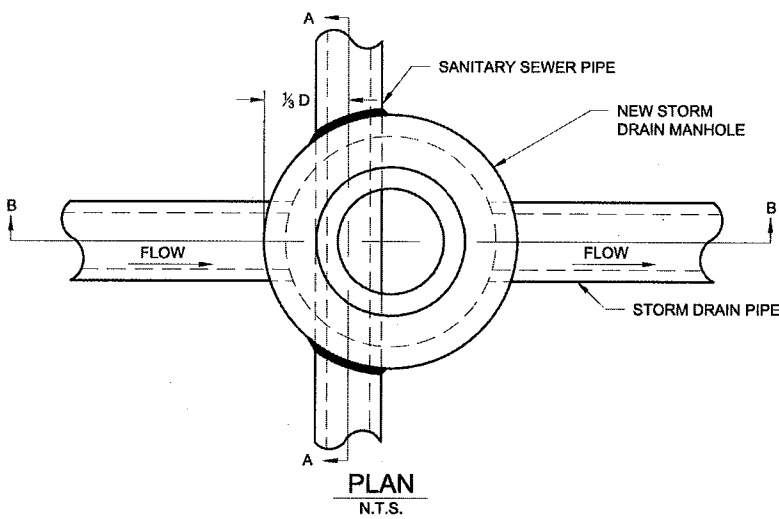
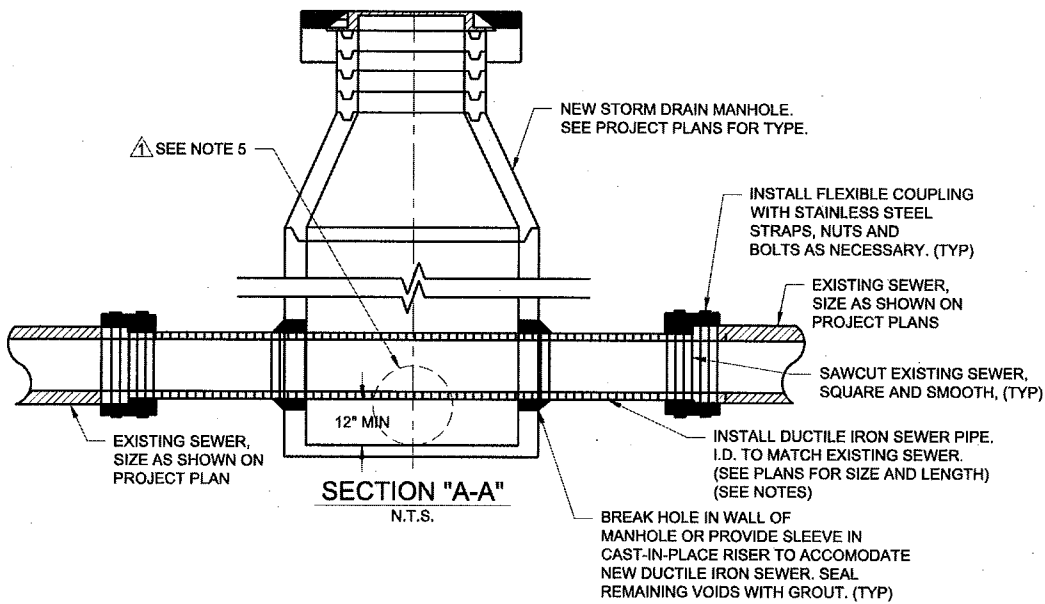
MANHOLE FRAME

MANHOLE COVER

NOTES:

1. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
2. MATERIAL SHALL BE CAST IRON.
3. FRAME AND COVER TO BE CONSTRUCTED IN ACCORDANCE WITH A.S.T.M. DESIGNATION A48, CLASS 25.
4. MANHOLE COVER DESIGN, AS A MINIMUM, IS TO HAVE THE WORDS "STORM SEWER" OR "STORM DRAIN" MOLDED INTO THE COVER.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	MANHOLE FRAME & COVER	
MARK	DATE	DESCRIPTION			
			APPROVED BY:	SCALE	DRAWING No.
			<i>[Signature]</i>	AS SHOWN	B-7
ADOPTED	4/1/2011		DISTRICT ENGINEER		SHEET 1 OF 1



NOTES:

1. DUCTILE IRON (DI) PIPE SHALL CONFORM TO THE REQUIREMENTS OF AWWA C150 OR BETTER. THE PIPE SHALL BE MANUFACTURED WITH STANDARD CAST IRON PIPE OUTSIDE DIAMETERS, AND THE NOMINAL LAYING LENGTH OF EACH JOINT SHALL BE 18 FEET.
2. THE INTERIOR SURFACE OF DI PIPE SHALL BE LINED WITH A FACTORY-APPLIED LINING OF EITHER:
 - A. PROTECTO 401 CERAMIC EPOXY LINING, A PRODUCT OF INDURON COATINGS, INC., AND HAVING A NOMINAL THICKNESS NO LESS THAN 40 MILS; OR
 - B. POLYBONDPLUS COMPOSITE FUSION-BONDED EPOXY AND POLYETHYLENE LINING, A PRODUCT OF AMERICAN CAST IRON PIPE COMPANY, AND HAVING A NOMINAL THICKNESS NO LESS THAN 80 MILS; OR
 - C. APPROVED EQUAL. FACTORY APPLICATION OF THE LINING, AND ANY NECESSARY FIELD APPLICATIONS FOR REPAIRS, SHALL CONFORM TO THE RECOMMENDATIONS OF THE LINING MANUFACTURER AND THE PIPE MANUFACTURER.
3. THE PIPE EXTERIOR SHALL HAVE A STANDARD ASPHALTIC COATING, AND WRAPPED WITH A GREEN, 8-MIL POLYETHYLENE WRAP CONFORMING TO THE PROVISIONS IN AWWA/ANSI C105/A21.5. THE POLYETHYLENE WRAP SHALL BE MARKED WITH THE WORDS "CAUTION: RAW SEWAGE."
4. THE CONTRACTOR SHALL OBTAIN THE NECESSARY PERMIT FROM THE JURISDICTION AGENCY BEFORE INTERRUPTING SEWER FLOW OR CUTTING SEWER PIPE.
5. THE SEWER PIPE CONFLICT SHALL LIE WITHIN THE UPPER 1/3 OF THE STORM DRAIN PIPE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	SANITARY SEWER THROUGH STORM DRAIN MANHOLE
MARK	DATE	DESCRIPTION		
⚠	1-1-2012	NOTE ADDED	APPROVED BY:	
ADOPTED			DISTRICT ENGINEER	SCALE AS SHOWN
4/1/2011			1-1-12 DATE	DRAWING No. <u>C-1</u> SHEET <u>1</u> OF <u>1</u>

**OUTFALL STRUCTURES
DESIGN TABLE I (TYPES "A"-"G")**

TYPE	MAX. PIPE SIZE	DESIGN (C.F.S)	A	B	C	D	E*	M	DWG. NO.
A	15"	0-5	4'-6"	2'-9"	2'-8 $\frac{1}{4}$ "	24"	2 $\frac{1}{2}$ "	1	D-2
B	18"	5-8	6'-0"	3'-3 $\frac{1}{2}$ "	3'-2 $\frac{3}{4}$ "	30"	2 $\frac{3}{4}$ "	2	D-2
C	24"	8-12	7'-0"	3'-10 $\frac{1}{2}$ "	3'-9 $\frac{3}{4}$ "	36"	3"	2	D-2
D	30"	12-16	8'-0"	-	-	42"	3 $\frac{1}{2}$ "	2	D-3, D-5
E	36"	16-21	9'-0"	-	-	48"	4"	2	D-3, D-5
F	42"	21-29	10'-0"	-	-	54"	4 $\frac{1}{2}$ "	2	D-3, D-5
G	48"	29-38	11'-0"	-	-	60"	5"	2	D-3, D-6, D-8

* IF POURED-IN-PLACE RISER IS APPROVED BY THE ENGINEER, "E" SHALL BE 8" MIN

**OUTFALL STRUCTURES
DESIGN TABLE II (TYPES "M"-"Q")**

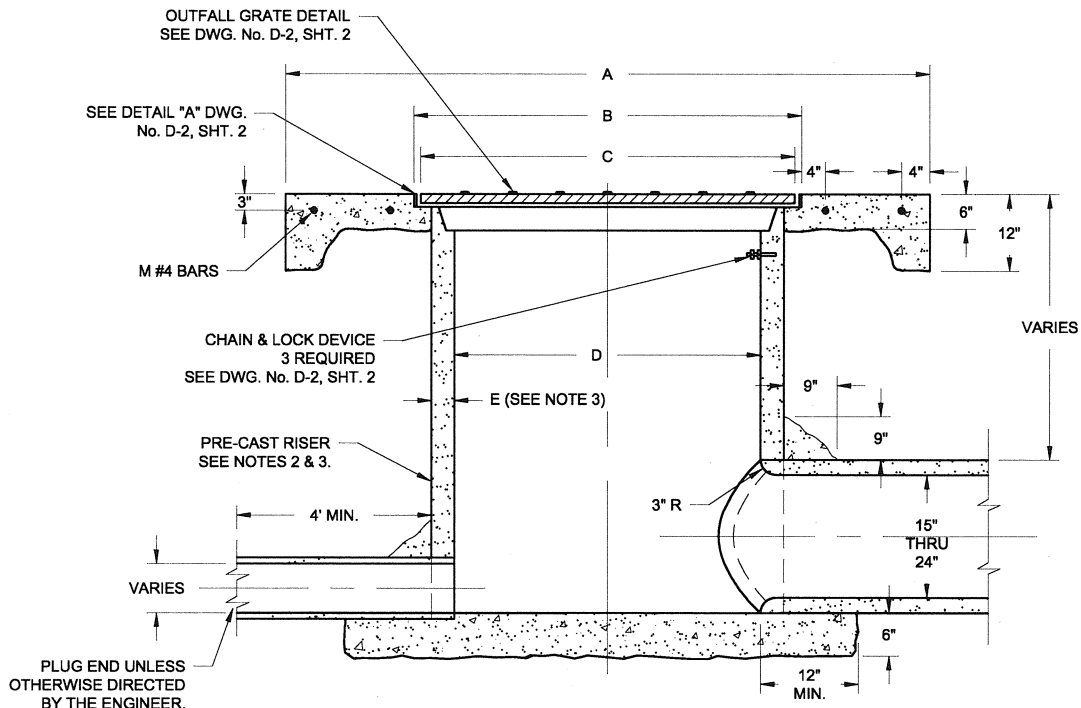
TYPE	MAX. PIPE SIZE	DESIGN (C.F.S)	A	D	F	M	N	W***	R*	DWG. NO.	G**
M	48"	38-50	11'-0"	5'-0"	2'-6"	2	3	8"	#4 AT 12"	D-4, D-6, D-8	72"
N	60"	50-65	12'-0"	6'-0"	3'-0"	3	4	8"	#4 AT 12"	D-4, D-6, D-8	84"
O	66"	65-85	14'-0"	7'-0"	3'-6"	3	5	8"	#4 AT 12"	D-4, D-6, D-8	96"
P	72"	85-110	16'-0"	8'-0"	4'-0"	3	6	10"	#5 AT 10"	D-4, D-6, D-8	114"
Q	84"	110-140	18'-0"	9'-0"	4'-6"	4	8	10"	#5 AT 10"	D-4, D-6, D-8	126"

* REINFORCEMENT SHALL CONSIST OF A DOUBLE CURTAIN BOTH DIRECTIONS OF THE SIZE AND SPACING NOTED. SEE DWG NO. D-4, SHEET 2.

** CIRCULAR RISER SECTIONS MAY BE USED IN PLACE OF THE SQUARE SECTIONS SHOWN ON DRAWING D-4. THE CIRCULAR DIAMETER TO BE USED IS GIVEN AS DIMENSION G.

*** IF POURED-IN-PLACE RISER IS APPROVED BY THE ENGINEER, "W" SHALL BE 12" MIN.

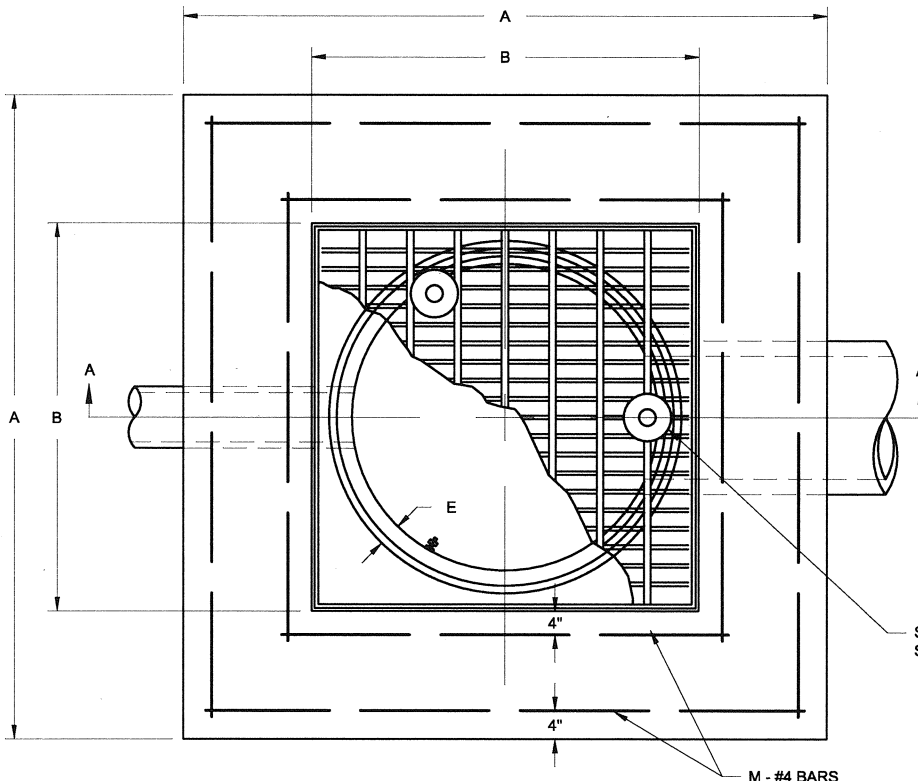
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	OUTFALL STRUCTURES DESIGN TABLES	
MARK	DATE	DESCRIPTION			
			APPROVED BY:		
			<i>[Signature]</i>		
			DISTRICT ENGINEER	4-1-11	
ADOPTED		4/1/2011			
				SCALE NO SCALE	DRAWING No. <u>D-1</u> SHEET <u>1</u> OF <u>1</u>



SECTION "A-A"
N.T.S.

NOTES:

1. FOR DIMENSIONS SEE DESIGN TABLE I, DWG. No. D-1.
2. PRE-CAST RISERS SHALL COMPLY WITH ASTM C-478, TYPE II CEMENT.
3. IF POURED-IN-PLACE RISER IS APPROVED BY THE ENGINEER, "E" SHALL BE 8" MIN.
4. OUTFALLS SHALL BE CONSTRUCTED PER SECTION 25 OF THE DISTRICT STANDARD SPECIFICATIONS.



PLAN
N.T.S.

STEEL PLATE, 3 REQUIRED
SEE DRAWING No. D-2, SHEET 2

REVISIONS		
MARK	DATE	DESCRIPTION

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:
[Signature]
DISTRICT ENGINEER

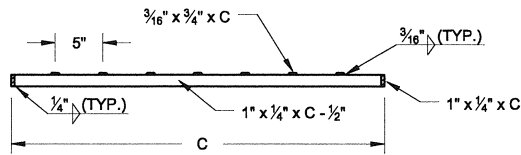
**OUTFALL STRUCTURES
TYPES A, B & C**

ADOPTED 4/1/2011

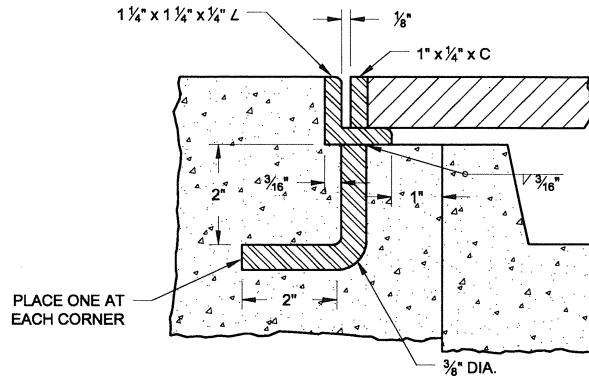
4-1-11
DATE

SCALE
AS SHOWN

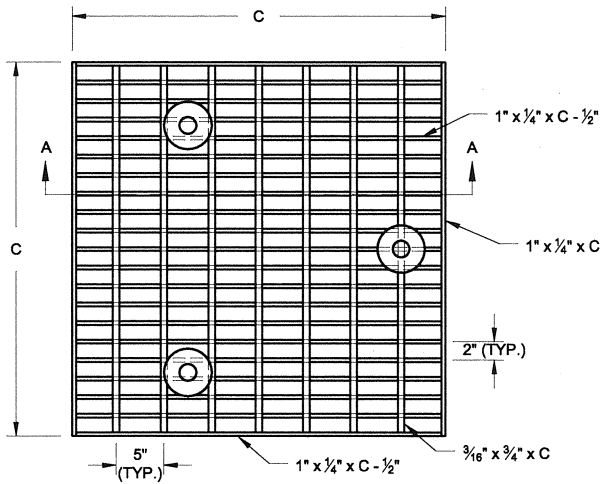
DRAWING No. D-2
SHEET 1 OF 2



SECTION "A-A"
N.T.S.



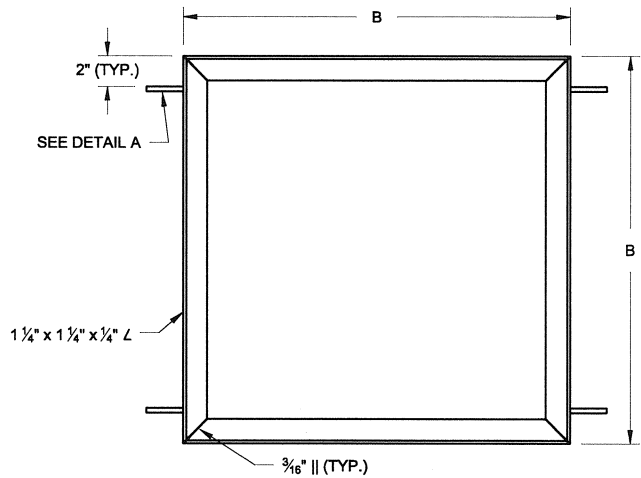
DETAIL "A"
N.T.S.



PLAN
N.T.S.

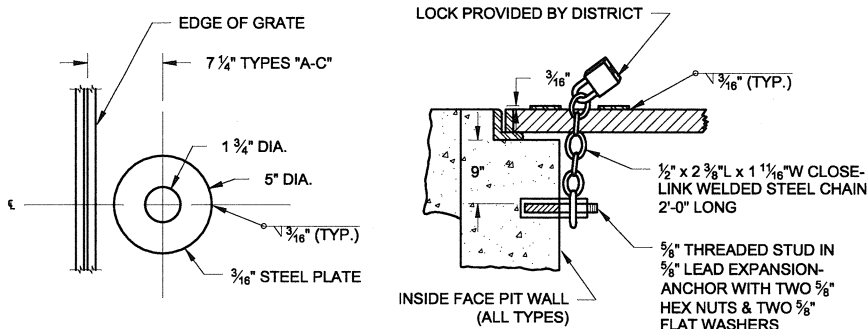
GRATE

NOTE: FOR DIMENSIONS
SEE DESIGN TABLE I
DRAWING No. D-1



PLAN
N.T.S.

GRATE FRAME



CHAIN AND LOCKING
DEVICE
N.T.S.

NOTES:

1. ALL EXPOSED METAL PARTS, INCLUDING GRATE, SHALL BE HOT-DIP GALVANIZED AFTER ASSEMBLY.
2. ALL PARTS SHALL BE STRUCTURAL GRADE STEEL.
3. ALL DIMENSIONS ARE FINISHED DIMENSIONS.

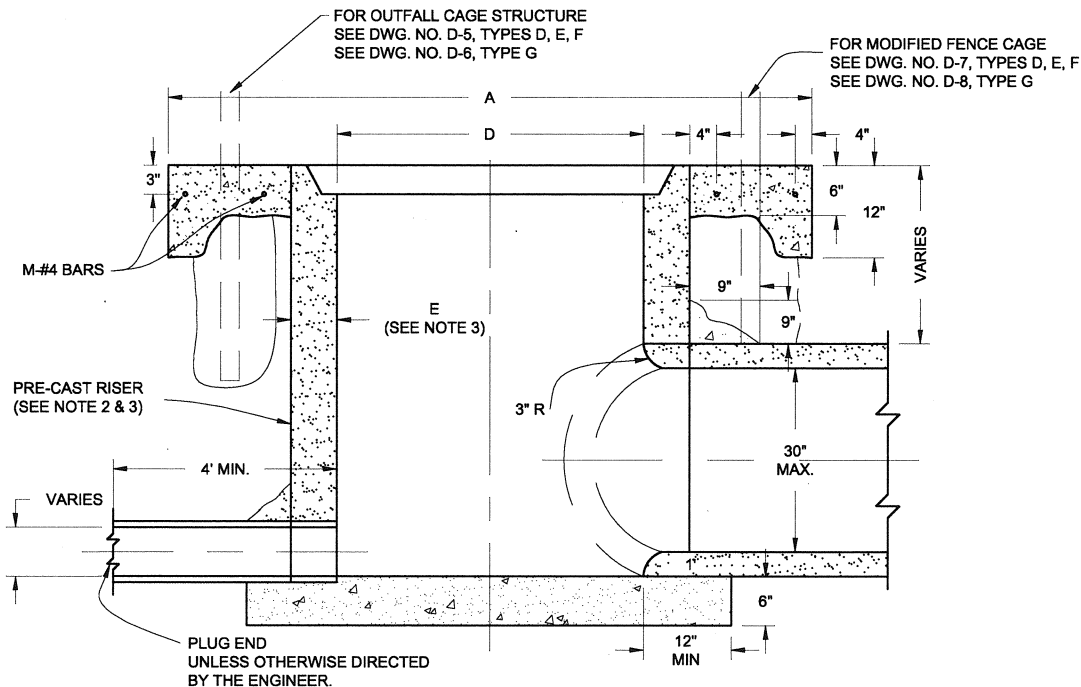
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

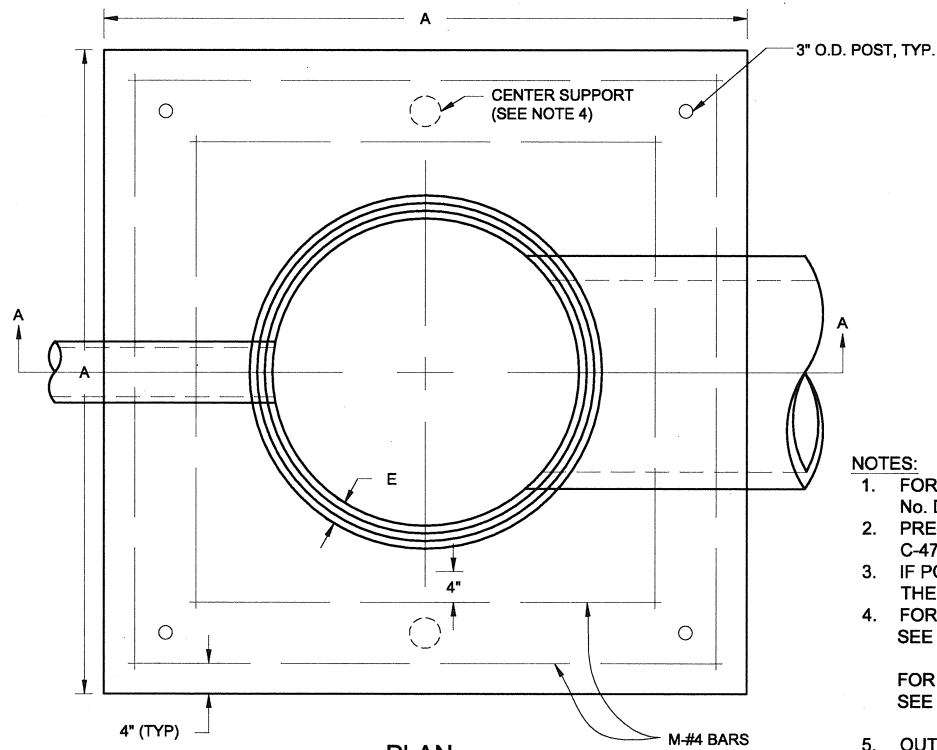
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**OUTFALL STRUCTURES
TYPES A, B & C
FRAME & GRATE DETAILS**

SCALE AS SHOWN DRAWING No. D-2
SHEET 2 OF 2



SECTION "A-A"
N.T.S.



PLAN
N.T.S.

- NOTES:**
1. FOR DIMENSIONS SEE DESIGN TABLE I, DWG. No. D-1
 2. PRE-CAST RISERS SHALL COMPLY WITH ASTM C-478, TYPE II CEMENT
 3. IF POURED-IN-PLACE RISER IS PERMITTED BY THE ENGINEER, "E" SHALL BE 8" MIN
 4. FOR CENTER SUPPORT DETAIL:
SEE DWG. D-5, TYPES D, E, F
DWG. D-6, TYPE G
FOR MODIFIED FENCE CAGE:
SEE DWG. D-7, TYPE D, E, F
DWG. D-8, TYPE G
 5. OUTFALLS SHALL BE CONSTRUCTED PER SECTION 25 OF THE DISTRICT STD. SPECIFICATIONS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:
[Signature] 4-1-11
DISTRICT ENGINEER DATE

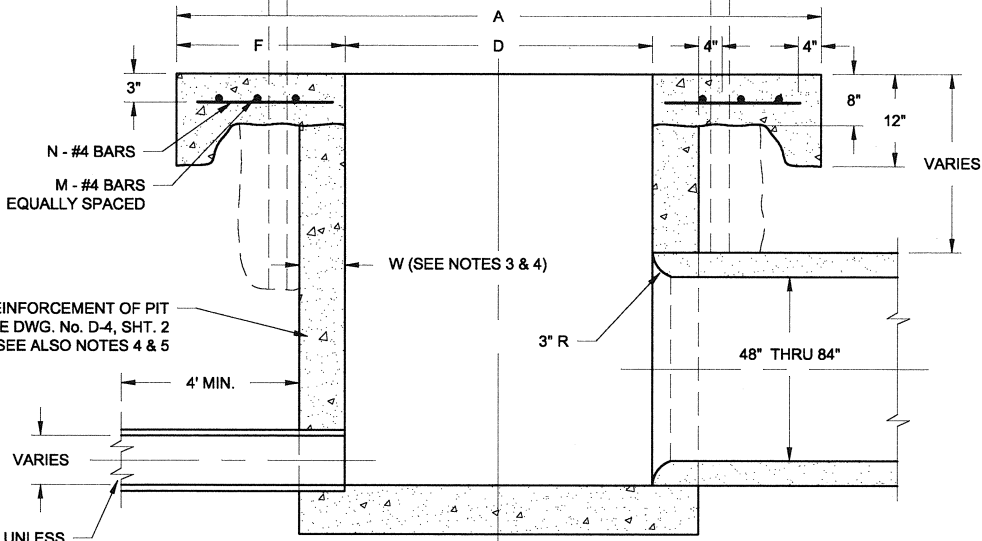
**OUTFALL STRUCTURES
TYPES D, E, F, & G**

SCALE AS SHOWN

DRAWING No. D-3
SHEET 1 OF 1

FOR OUTFALL CAGE STRUCTURE
SEE DWG. No. D-6

FOR MODIFIED FENCE CAGE
SEE DWG. No. D-8



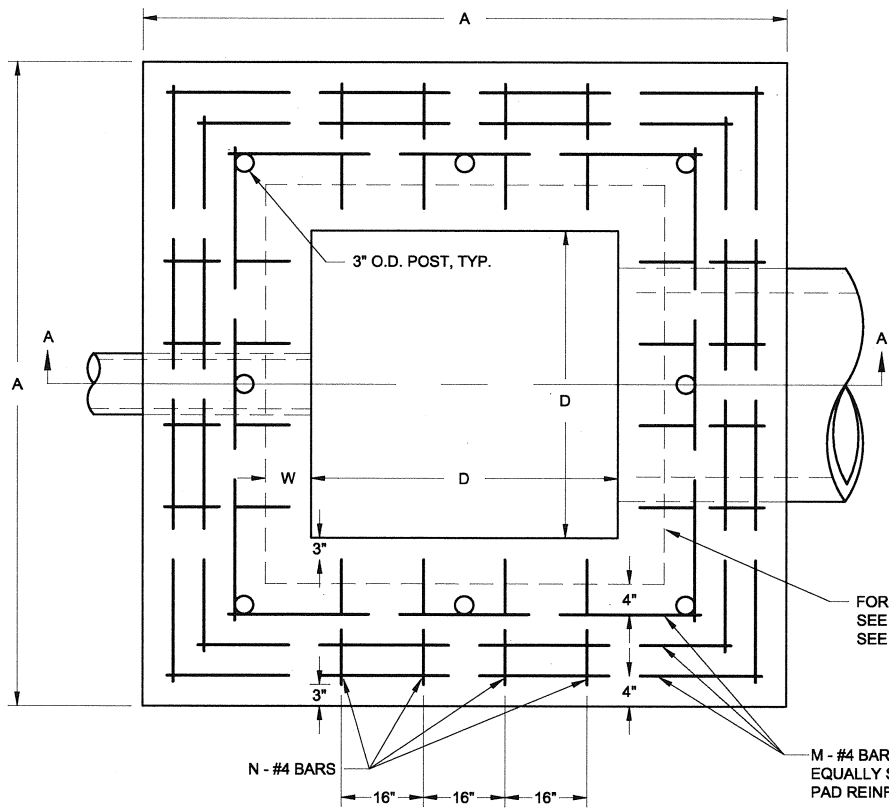
FOR REINFORCEMENT OF PIT
SEE DWG. No. D-4, SHT. 2
SEE ALSO NOTES 4 & 5

PLUG END UNLESS
OTHERWISE DIRECTED
BY THE ENGINEER.

SECTION "A-A"
N.T.S.

NOTES:

1. FOR DIMENSIONS SEE DESIGN TABLE II DWG. No. D-1.
2. OUTFALLS SHALL BE CONSTRUCTED PER SECTION 25 OF THE DISTRICT STANDARD SPECIFICATIONS.
3. CIRCULAR RISERS MAY BE USED IF APPROVED BY THE ENGINEER. ENLARGE CAGE STRUCTURE AND CONCRETE SLAB TO INCREASE CAGE SUPPORT SPACING TO ELIMINATE CONFLICT BTWN RISER WALL AND CAGE FOOTINGS.
4. PRE-CAST CIRCULAR RISERS SHALL COMPLY WITH ASTM C478, TYPE II CEMENT. FOR POURED-IN-PLACE RISERS, "W" SHALL BE 12" MIN.



FOR PIT REINFORCEMENT
SEE DWG. No. D-4, SHT. 2
SEE ALSO NOTES 3 & 4

M - #4 BARS
EQUALLY SPACED
PAD REINFORCEMENT

PLAN
N.T.S.

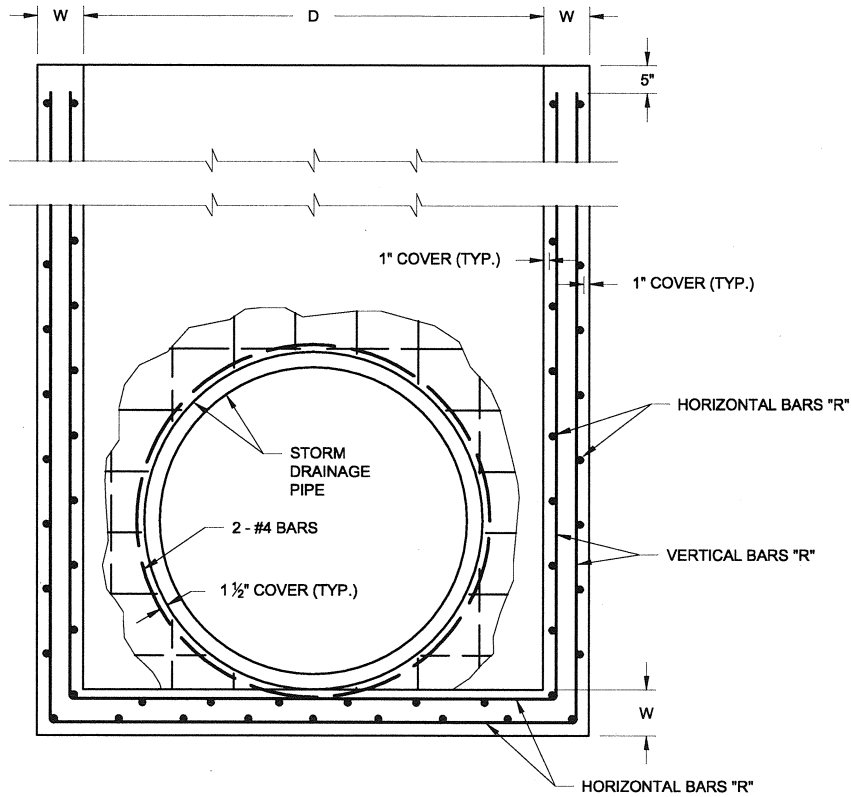
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**OUTFALL STRUCTURES
TYPES M, N, O, P & Q**

SCALE AS SHOWN DRAWING No. D-4
SHEET 1 OF 2

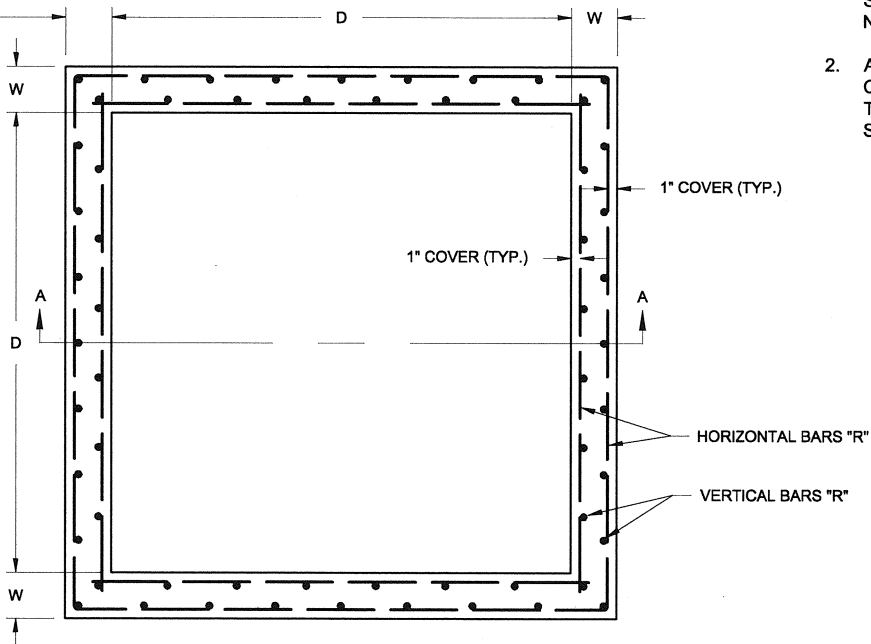


SECTION "A-A"
N.T.S.

NOTES:

1. FOR DIMENSIONS AND REBAR SIZE AND SPACING SEE DESIGN TABLE II, DWG. No. D-1.
2. ALL REINFORCEMENT SHALL CONFORM TO SECTION II OF THE STANDARD SPECIFICATIONS.

W (SEE NOTES 3 & 4
DWG. No. D-4
SHEET 1 OF 2)



PLAN
N.T.S.

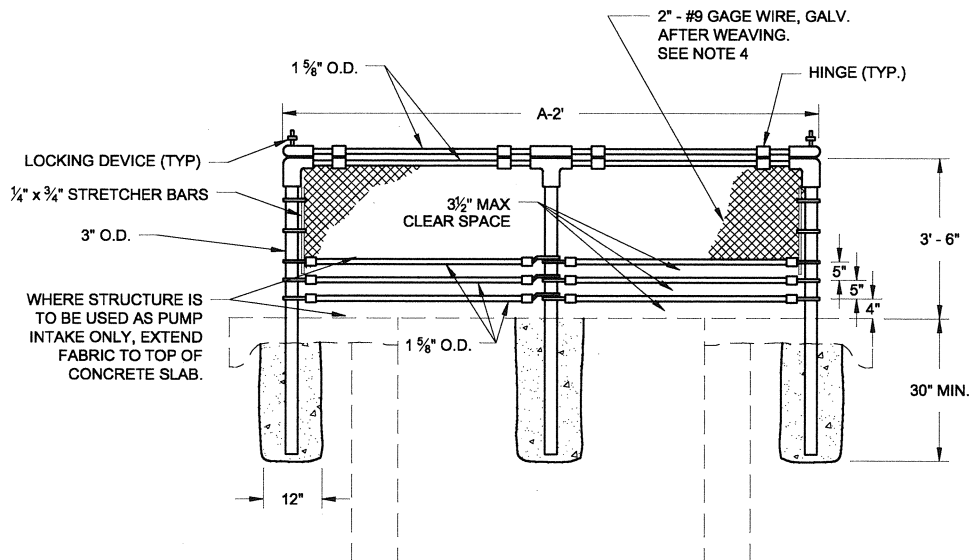
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**OUTFALL STRUCTURES
TYPES M, N, O, P & Q
REINFORCEMENT DETAILS**

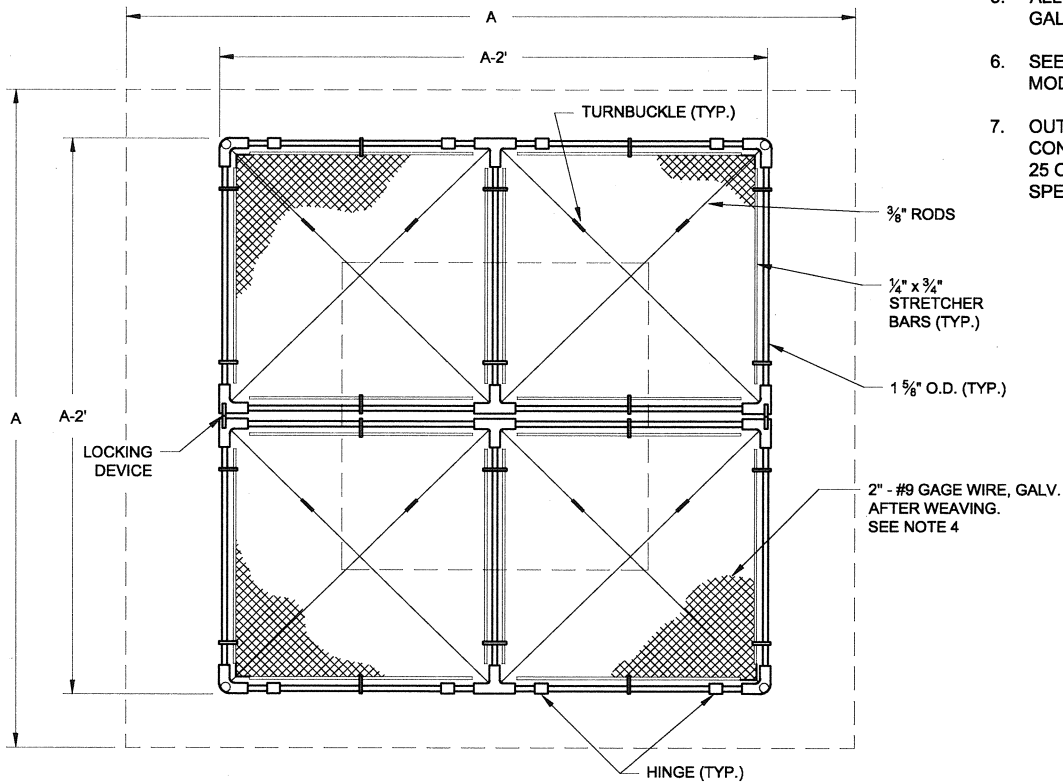
SCALE AS SHOWN DRAWING No. D-4
SHEET 2 OF 2



PROFILE
N.T.S.

NOTES:


1. FOR DIMENSION SEE DESIGN TABLES DWG. No. D-1.
2. LOCKING DEVICE SHALL BE APPROVED BY ENGINEER.
3. LOCK WILL BE SUPPLIED BY THE DISTRICT.
4. WHERE VINYL-COATED FABRIC IS REQUIRED BY THE PROJECT PLANS OR SPECIAL PROVISIONS, FABRIC SHALL COMPLY WITH SECTION 25 OF THE FMFCD STANDARD SPECIFICATIONS. EXCEPT UNDERLYING WIRE SHALL REMAIN 9 GAGE.
5. ALL METAL PARTS SHALL BE GALVANIZED.
6. SEE DRAWING No. D-8 FOR MODIFIED FENCE CAGE.
7. OUTFALL CAGES SHALL BE CONSTRUCTED PER SECTION 25 OF THE FMFCD STANDARD SPECIFICATIONS.



PLAN
N.T.S.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

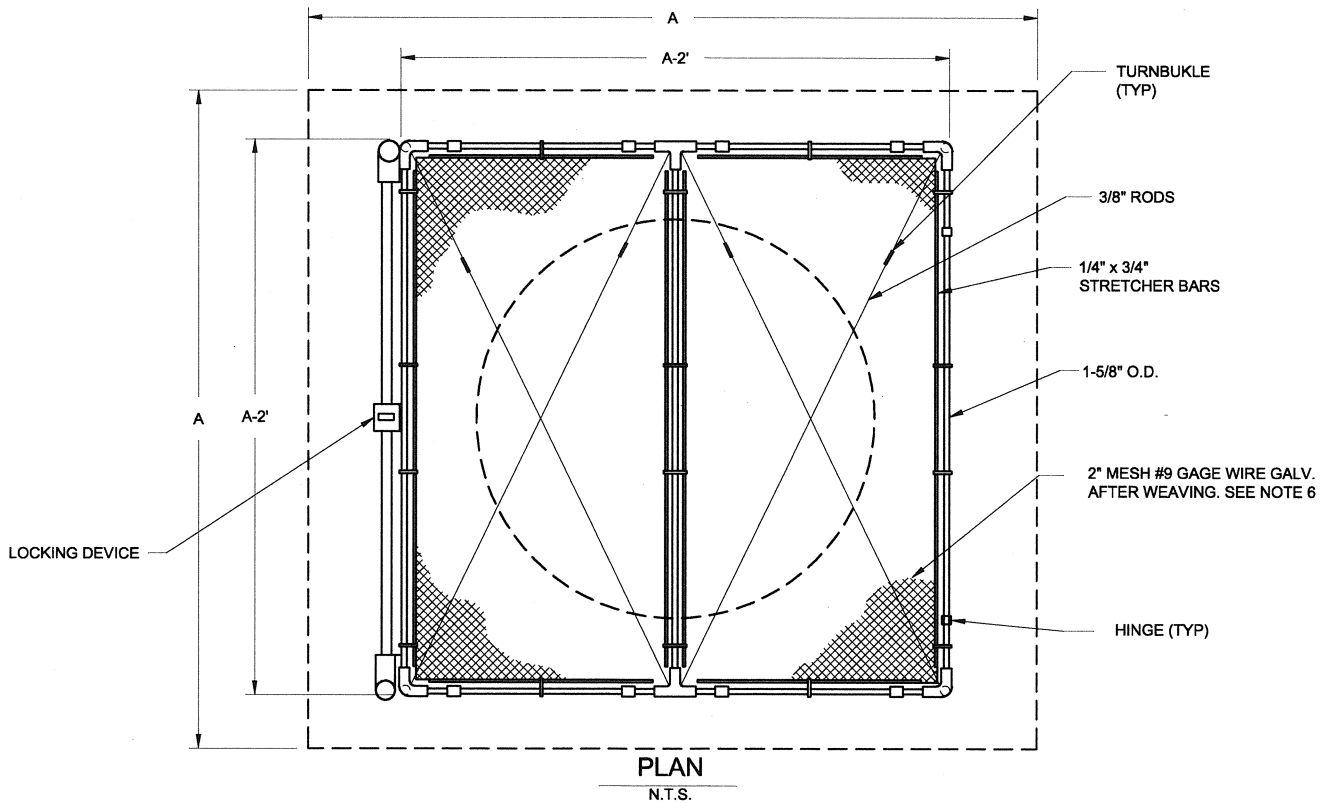
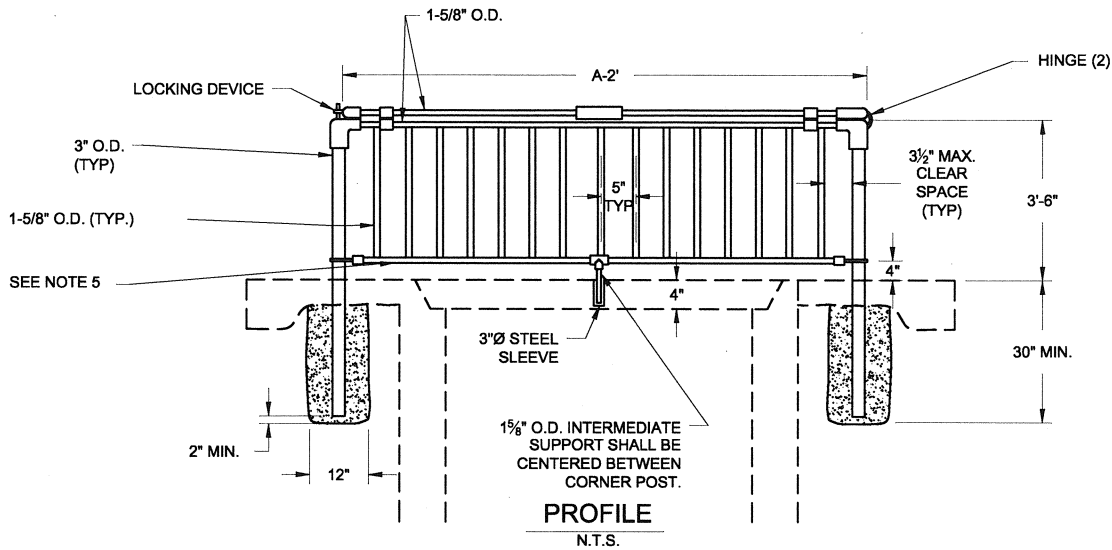
APPROVED BY:

 DISTRICT ENGINEER

4-1-11
DATE

**FENCE CAGE FOR
OUTFALL STRUCTURES
TYPES G, M, N, O, P & Q**

SCALE AS SHOWN

DRAWING No. D-6
SHEET 1 OF 1




NOTES:

1. FOR DIMENSIONS SEE DESIGN TABLE DWG. NO. D-1.
2. LOCKING DEVICE SHALL BE APPROVED BY ENGINEER.
3. LOCK WILL BE SUPPLIED BY THE DISTRICT.
4. ALL METAL PARTS SHALL BE GALVANIZED.
5. PIPE INTERSECTIONS MAY BE EITHER TEE FITTINGS OR CUT AND WELDED CONNECTIONS AND REGALVANIZED.
6. WHERE VINYL-COATED FABRIC IS REQUIRED BY THE PROJECT PLANS OR SPECIAL PROVISIONS, FABRIC SHALL COMPLY WITH SECTION 28 OF THE FMFCD STD. SPECIFICATIONS EXCEPT THE UNDERLYING WIRE SHALL REMAIN 9 GAGE.
7. OUTFALL CAGES SHALL BE CONSTRUCTED PER SECTION 25 OF THE FMFCD STD. SPECIFICATIONS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

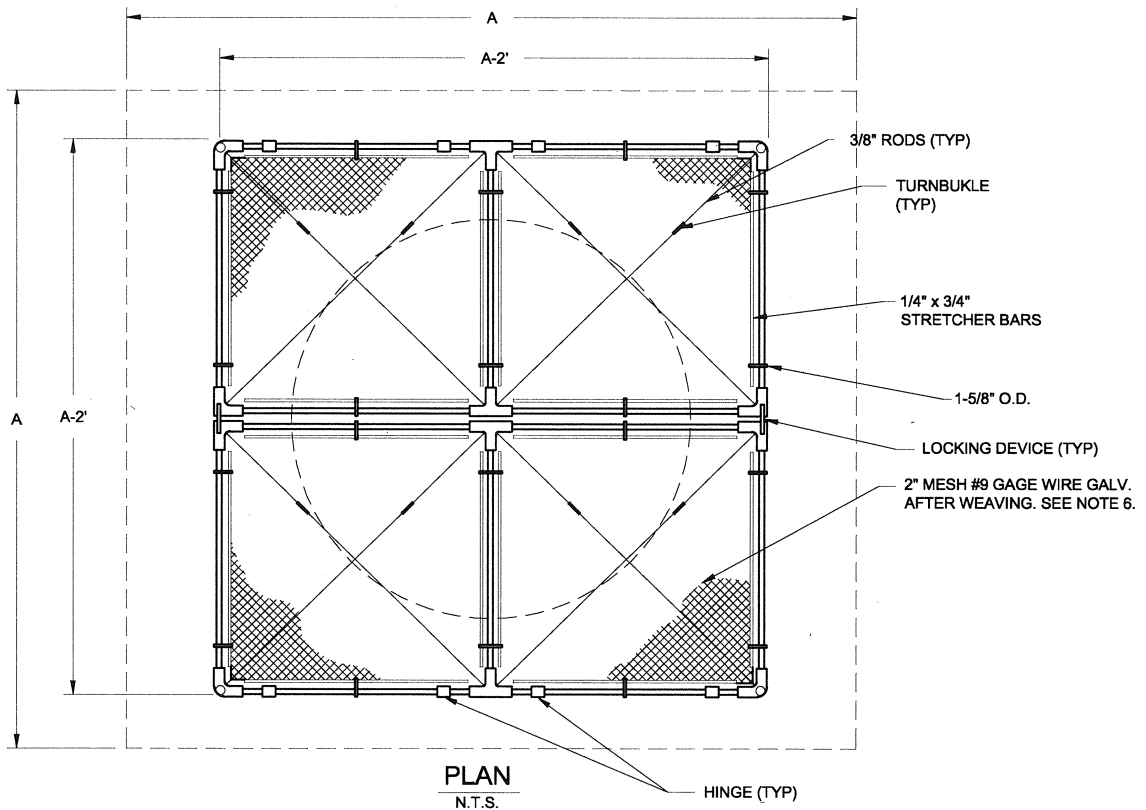
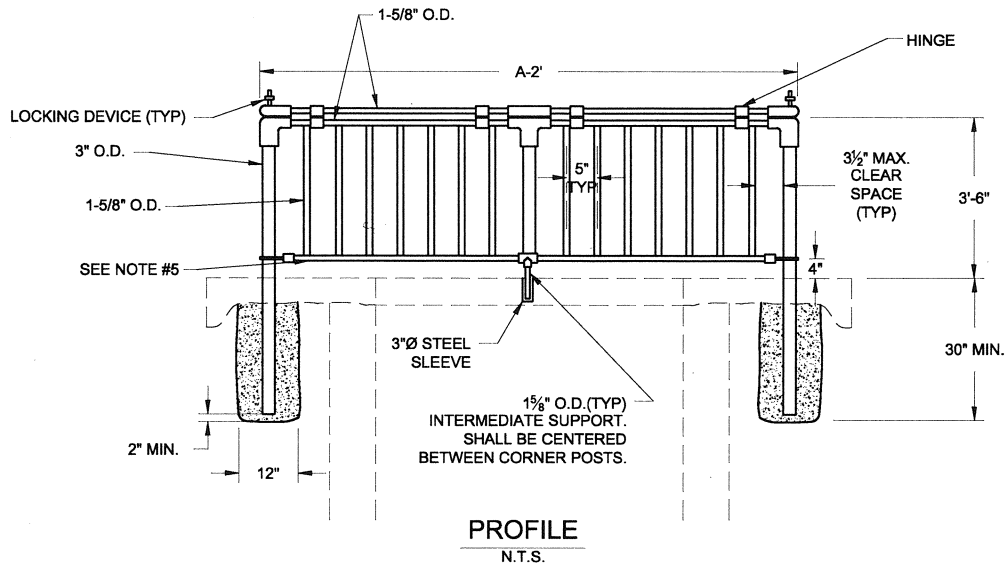
APPROVED BY:

 DISTRICT ENGINEER

4-1-11
DATE

**MODIFIED FENCE CAGE FOR
OUTFALL STRUCTURES
TYPES D, E, & F**

SCALE AS SHOWN

DRAWING No. D-7
SHEET 1 OF 1



NOTES:

1. FOR DIMENSIONS SEE DESIGN TABLE DWG. NO. D-1.
2. LOCK WILL BE SUPPLIED BY THE DISTRICT.
3. PIPE INTERSECTIONS SHALL BE CUT AND WELDED CONNECTIONS.
4. ALL METAL PARTS SHALL BE GALVANIZED.
5. PIPE INTERSECTIONS MAY BE EITHER TEE FITTINGS OR CUT AND WELDED CONNECTIONS AND REGALVANIZED.
6. WHERE VINYL-COATED FABRIC IS REQUIRED BY THE PROJECT PLANS OR SPECIAL PROVISIONS, FABRIC SHALL COMPLY WITH SECTION 28 OF THE FMFCD STD. SPECIFICATIONS EXCEPT THE UNDERLYING WIRE SHALL REMAIN 9 GAGE.
7. OUTFALL CAGES SHALL BE CONSTRUCTED PER SECTION 25 OF THE FMFCD STD. SPECIFICATIONS.

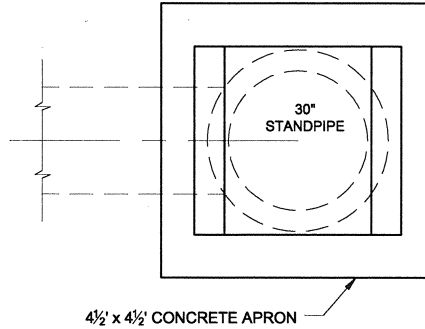
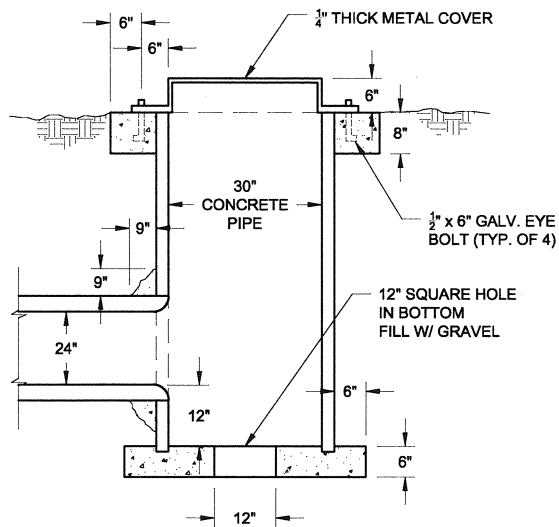
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

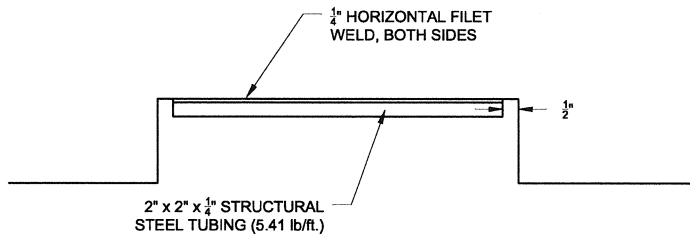
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**MODIFIED FENCE CAGE FOR
OUTFALL STRUCTURES
TYPES G, M, N, O, P, & Q**

SCALE AS SHOWN DRAWING No. D-8
SHEET 1 OF 1

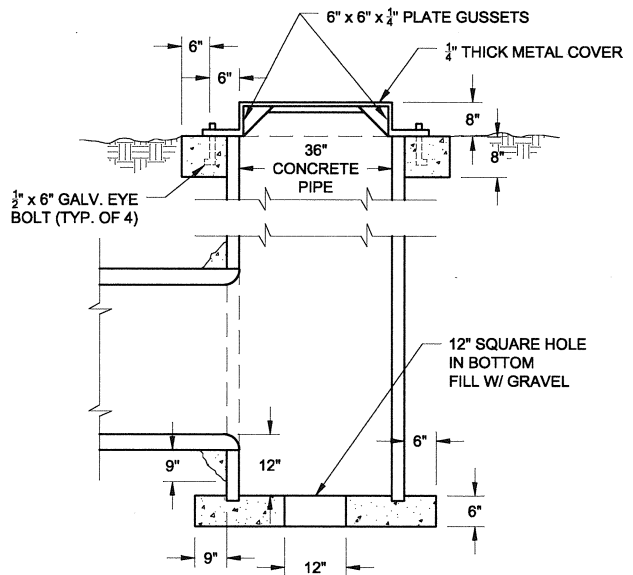
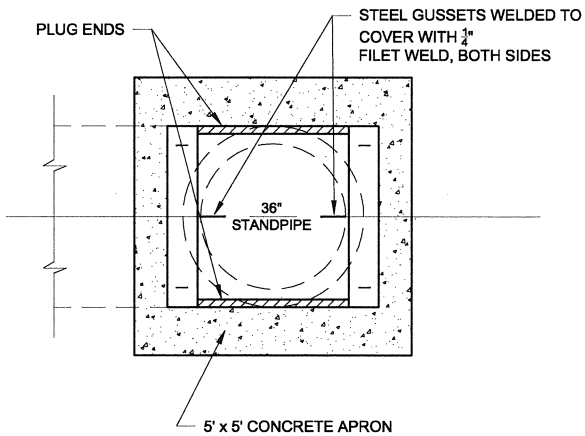


30" RISER
N.T.S.



NOTES:


1. RISER PIPE SHALL COMPLY W/ ASTM C478, TYPE II CEMENT.
2. ALL METAL PARTS SHALL BE GALVANIZED.



36" RISER
N.T.S.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

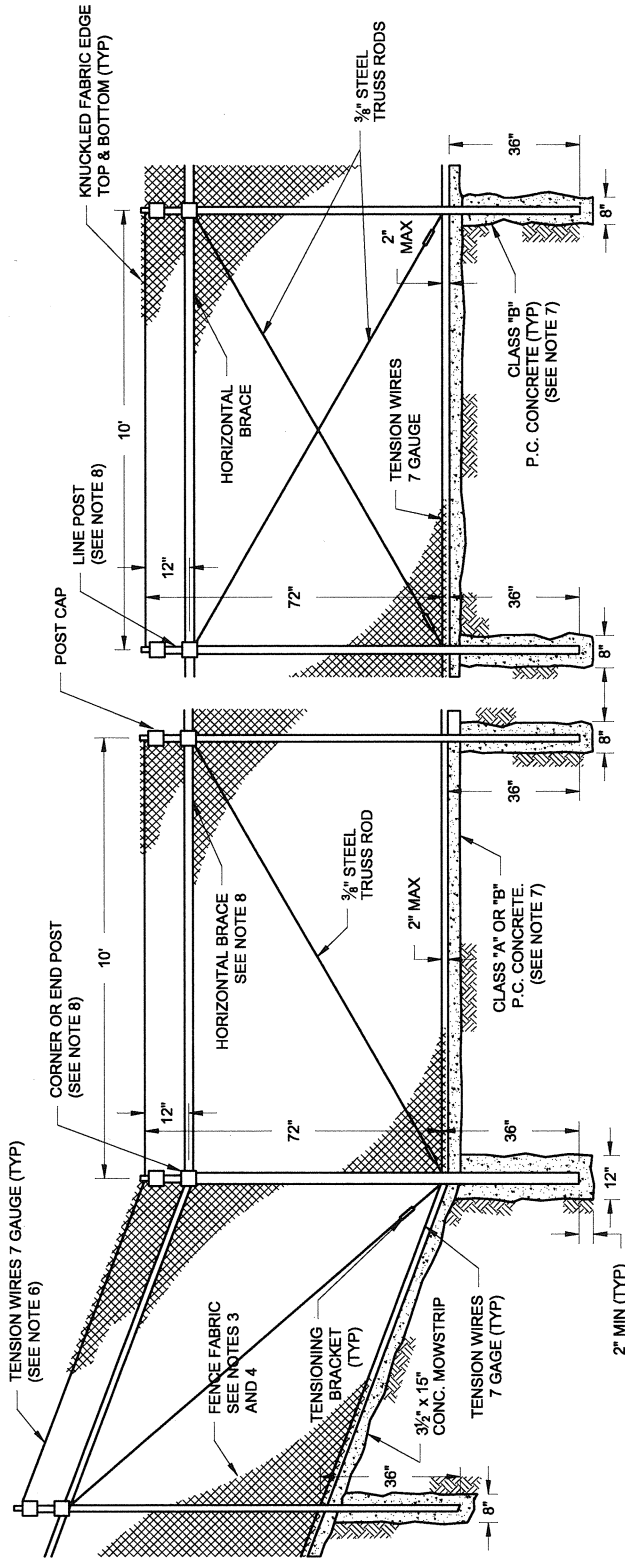
APPROVED BY:

 DISTRICT ENGINEER

4-1-11
DATE

**TYPE R TEMPORARY
OUTFALL STRUCTURE**

SCALE AS SHOWN

DRAWING No. D-9
SHEET 1 OF 1



CORNER POST BRACING


LINE POST BRACING
AT 1,000' MAX INTERVALS

NOTES:

1. CHAIN LINK FENCE SHALL BE FURNISHED AND CONSTRUCTED IN ACCORDANCE WITH SECTION 28 OF THE DISTRICT STD. SPECIFICATIONS.
2. ALL METAL SHALL BE GALVANIZED. DEFECTIVE GALVANIZED MATERIAL OR MATERIAL WITH SERIOUSLY ABRADED GALVANIZING SHALL NOT BE USED IN THE WORK. REPAIR TO GALVANIZING AUTHORIZED BY THE ENGINEER SHALL COMPLY WITH SECTION 28 OF THE DISTRICT STD. SPECIFICATIONS.
3. FENCE FABRIC SHALL BE 9 GAGE WIRE, 2-INCH MESH, CONFORMING TO ASTM A392, CLASS 1 ZINC COATING.
4. WHERE VINYL COATED FENCE FABRIC IS SHOWN ON THE PLANS OR SPECIFIED IN THE SPECIAL PROVISIONS, THE UNDERLYING FENCE FABRIC SHALL BE 11 GAGE WIRE, 2-INCH MESH CONFORMING TO ASTM A392, CLASS 1 ZINC COATING. VINYL COATING SHALL BE BLACK UNLESS OTHERWISE SPECIFIED, AND CONFORM TO ASTM F668-07, CLASS 2(B) POLYMER COATING, FUSED AND ADHERED TO THE ZINC COATED FABRIC. FINISH COATED FABRIC WIRE SHALL BE 8 GAGE MINIMUM.
5. POSTS AND BRACES SHALL BE ROUND STEEL PIPE CONFORMING TO ASTM A53, AND GALVANIZED PER ASTM A123.
6. TENSION WIRE SHALL BE 7 GAGE COIL SPRING STEEL. TIE WIRES AND HOG RINGS SHALL BE 9 GAGE STEEL MINIMUM. ALL WIRE SHALL BE GALVANIZED PER ASTM A116, COATING CLASS 3.
7. CONCRETE FOR FOOTINGS SHALL BE CLASS B. MOWSTRIPS SHALL BE CLASS A OR B CONCRETE AND CONSTRUCTED IN ACCORDANCE WITH SECTION 27 OF THE DISTRICT STD. SPECIFICATIONS.
8. LINE POSTS: 2 3/4" O.D., 3.65 LBS./FT.
CORNER AND END POSTS: 2 7/8" O.D., 5.79 LBS./FT.
BRACES: 1 5/8" O.D., 2.27 LBS./FT.

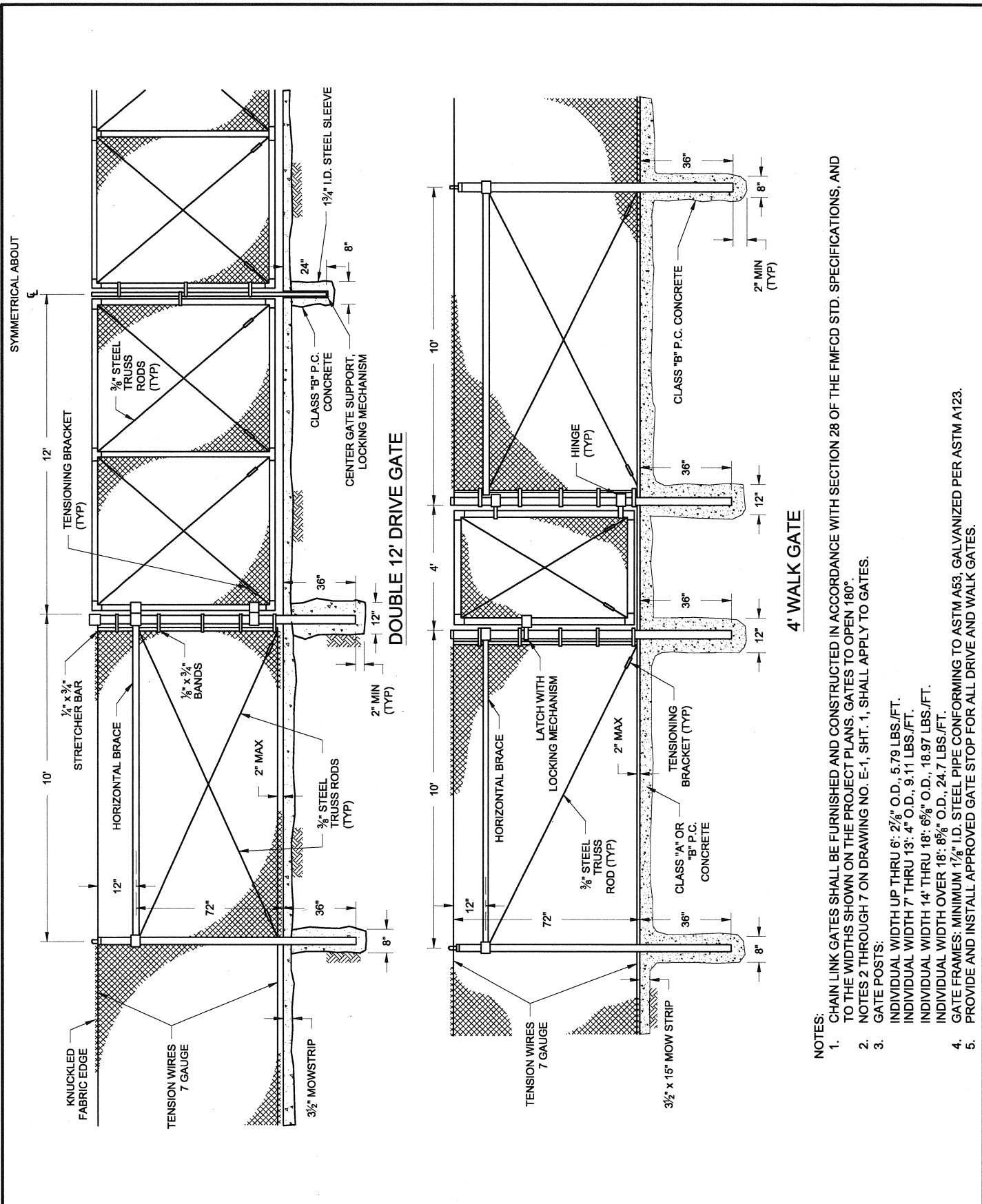
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

 DISTRICT ENGINEER DATE: 4-1-11

6' CHAIN LINK FENCE

SCALE: NO SCALE DRAWING No. E-1
SHEET 1 OF 1



- NOTES:
- CHAIN LINK GATES SHALL BE FURNISHED AND CONSTRUCTED IN ACCORDANCE WITH SECTION 28 OF THE FMFCD STD. SPECIFICATIONS, AND TO THE WIDTHS SHOWN ON THE PROJECT PLANS. GATES TO OPEN 180°.
 - NOTES 2 THROUGH 7 ON DRAWING NO. E-1, SHT. 1, SHALL APPLY TO GATES.
 - GATE POSTS:
 INDIVIDUAL WIDTH UP THRU 6': 2 5/8" O.D., 5.79 LBS./FT.
 INDIVIDUAL WIDTH 7' THRU 13': 4" O.D., 9.11 LBS./FT.
 INDIVIDUAL WIDTH 14' THRU 18': 6 5/8" O.D., 18.97 LBS./FT.
 INDIVIDUAL WIDTH OVER 18': 8 5/8" O.D., 24.7 LBS./FT.
 - GATE FRAMES: MINIMUM 1 7/8" I.D. STEEL PIPE CONFORMING TO ASTM A53, GALVANIZED PER ASTM A123.
 - PROVIDE AND INSTALL APPROVED GATE STOP FOR ALL DRIVE AND WALK GATES.

REVISIONS		
MARK	DATE	DESCRIPTION

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

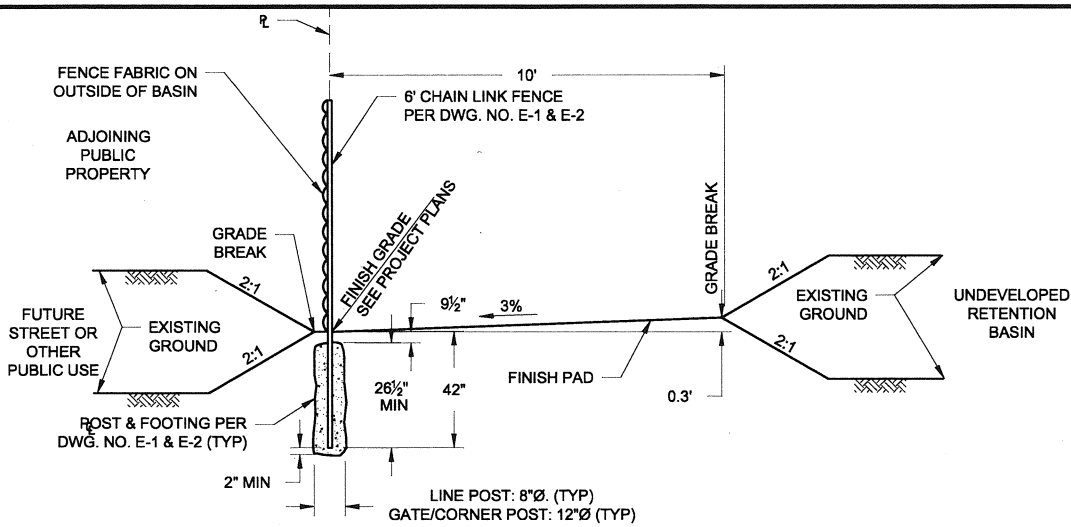
APPROVED BY:
James Takeman 4-1-11
 DISTRICT ENGINEER DATE

**6' CHAIN LINK FENCE
GATE DETAILS**

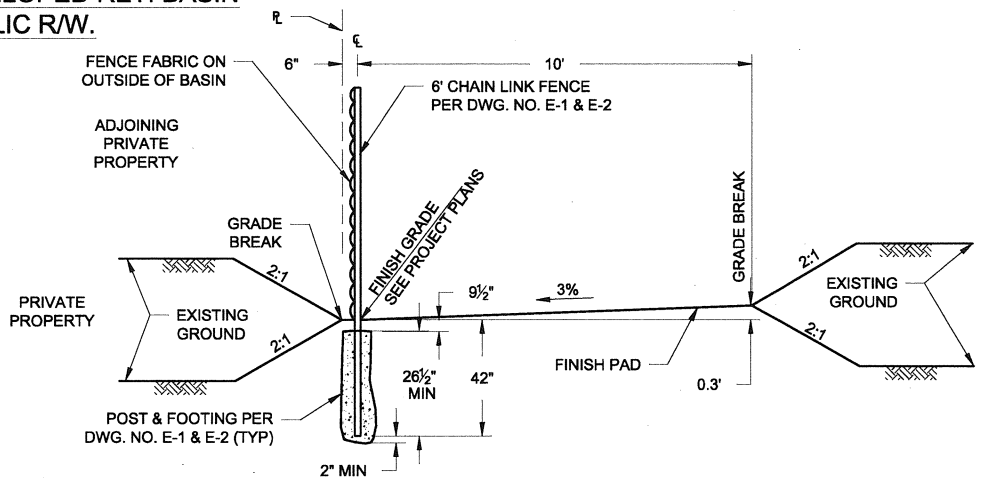
SCALE
NO SCALE

DRAWING No. E-2
SHEET 1 OF 1

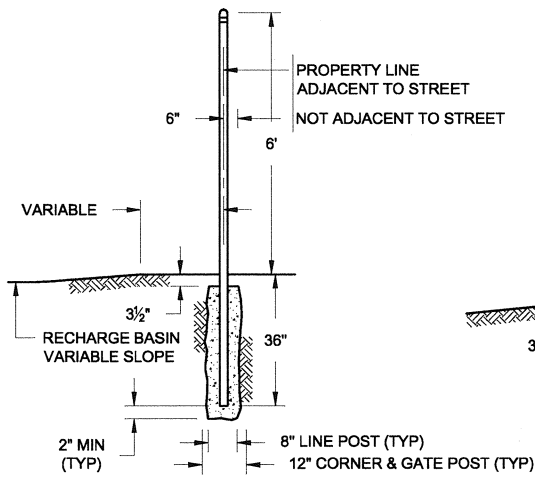
ADOPTED 4/1/2011



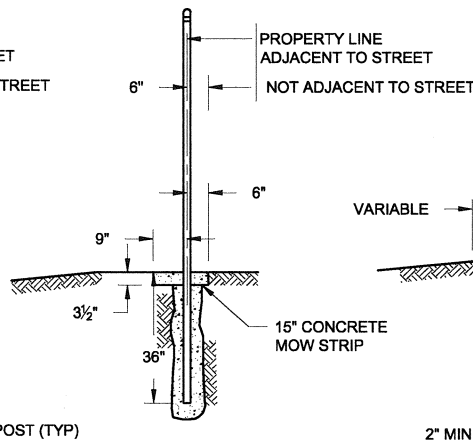
**FENCE PAD GRADING, UNDEVELOPED RET. BASIN
ADJACENT TO PUBLIC R/W.**



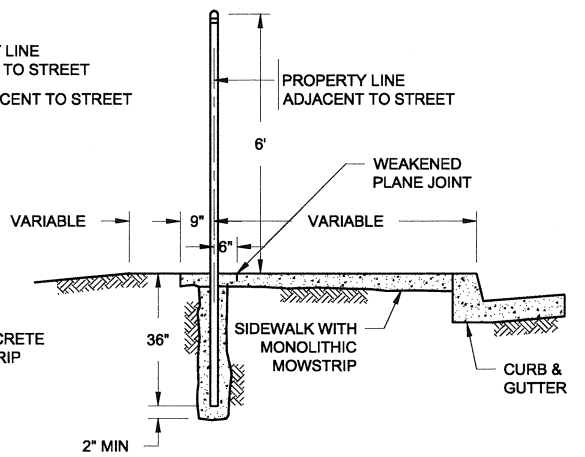
**FENCE PAD GRADING, UNDEVELOPED RET.
BASIN ADJACENT TO PRIVATE PROPERTY.
REQUIRES WRITTEN RIGHT OF ENTRY FROM PROPERTY OWNER.**



FOOTING



FOOTING & MOWSTRIP




FOOTING & SIDEWALK

**FENCE PAD / MOWSTRIP, DEVELOPED
RETENTION BASIN**

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

 DISTRICT ENGINEER

4-1-11
 DATE

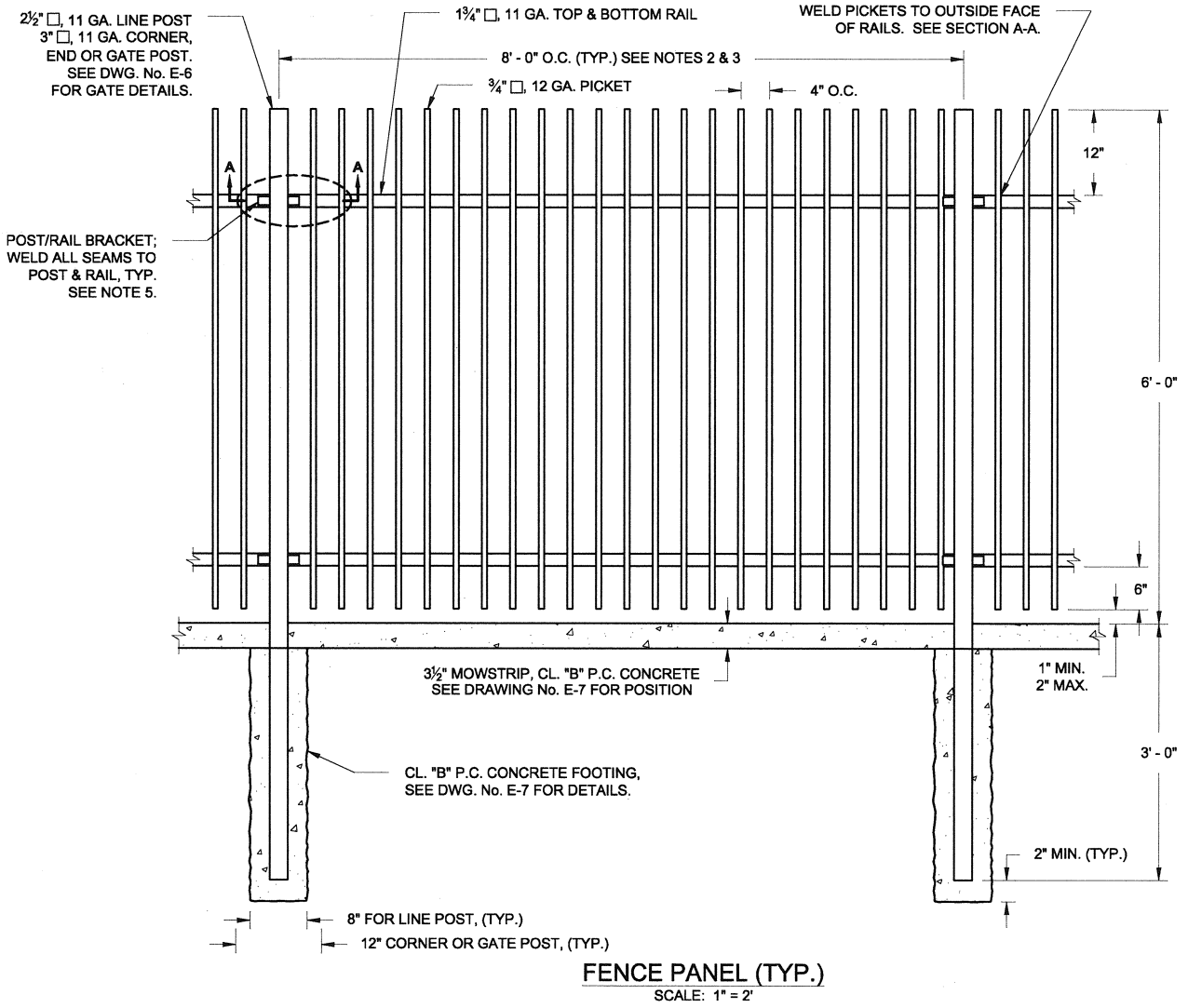
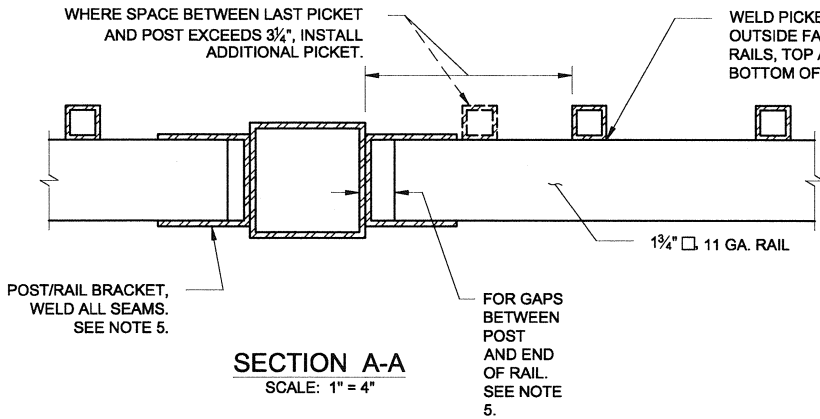
**FENCE PAD GRADING, POST &
MOWSTRIP LOCATION**

SCALE
AS SHOWN

DRAWING No. E-3
 SHEET 1 OF 1

NOTES :

1. FENCE SHALL COMPLY WITH DISTRICT STANDARD SPECIFICATIONS SECTION 29.
2. EXCEPT FOR END PANELS, FENCE PANELS SHALL BE MANUFACTURED AND INSTALLED TO THE 8' LENGTH AS SHOWN.
3. END FENCE PANELS MAY BE LESS THAN 8' IN LENGTH. ALL OTHER COMPONENT DIMENSIONS TO REMAIN THE SAME.
4. ALL PICKETS AND POSTS TO BE FITTED WITH RAINPROOF CAPS. PICKET CAPS MAY BE METAL OR PLASTIC. POST CAPS SHALL BE METAL.
5. FOR POST-RAIL GAPS UP TO 1/2", USE "U" OR SLEEVE-TYPE BRACKETS. FOR GAPS 1/2" - 1", USE ONLY SLEEVE-TYPE BRACKET. FOR GAPS EXCEEDING 1", REMOVE AND RESET POST.
6. FENCE SURFACES SHALL BE CLEANED, PRIMERED AND PAINTED PER DISTRICT STANDARD SPECIFICATIONS SECTION 32. FINAL COATING SHALL BE BLACK, WITH EGG SHELL OR SEMI-GLOSS FINISH.



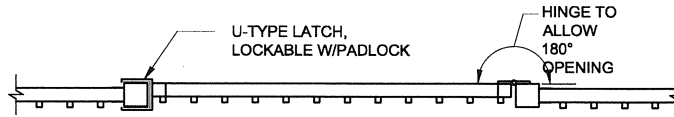
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

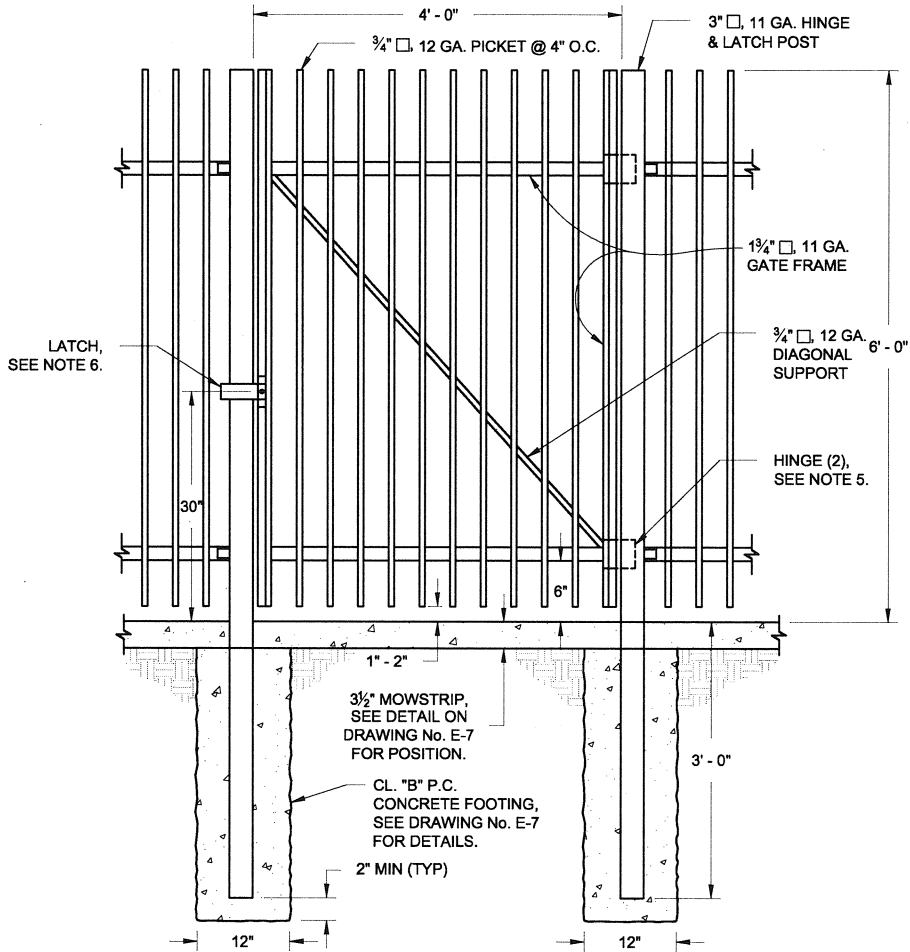
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**6' ORNAMENTAL
METAL FENCE**

SCALE: AS SHOWN DRAWING No. E-5
SHEET 1 OF 1



TOP VIEW



**4'-WIDE
ORNAMENTAL
METAL GATE**
SCALE: 1" = 2'

NOTES:

1. GATE AND POSTS SHALL COMPLY WITH DISTRICT STD. SPECIFICATIONS SECTION 29.
2. GATE FRAME & DIAGONAL SUPPORT SHALL BE WELDED AT ALL JOINTS.
3. PICKETS SHALL BE WELDED TO OUTSIDE FACE OF GATE FRAME AND DIAGONAL SUPPORT. WELD ON INSIDE FACE OF PICKETS TO TOP & BOTTOM OF BOTH RAILS AND DIAGONAL SUPPORT
4. GATE POSTS AND PICKETS TO BE FURNISHED WITH RAIN-PROOF CAPS, SAME AS FENCE, DRAWING No. E-5.
5. HINGES SHALL BE OF SUFFICIENT SIZE AND STRENGTH TO SUPPORT GATE; MINIMUM OF 2. HINGES SHALL BE WELDED TO GATE FRAME AND POST.
6. LATCH SHALL BE "U" SHAPE TO FIT OVER LATCH POST; PADLOCK EYE SHALL BE INTEGRAL PART OF LATCH. LATCH TO BE BOLTED TO GATE FRAME USING STAINLESS STEEL BOLTS.
7. ALL GATE AND POST SURFACES SHALL BE CLEANED, PRIMERED AND PAINTED PER STD. SPECIFICATIONS, SECTION 32, FINAL COATING BLACK WITH EGGSHELL OR SEMI-GLOSS FINISH.
8. PROVIDE AND INSTALL PRE-MANUFACTURED STOP TO HOLD GATE IN FULLY OPEN POSITION (180°).

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

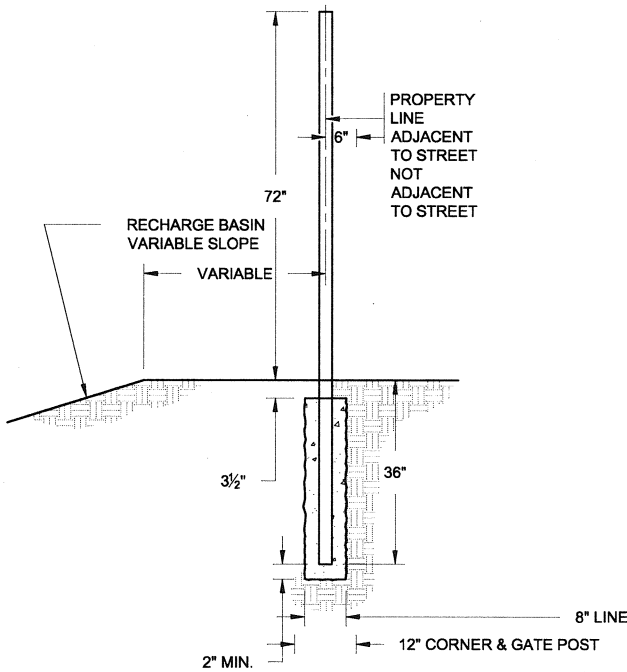
**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

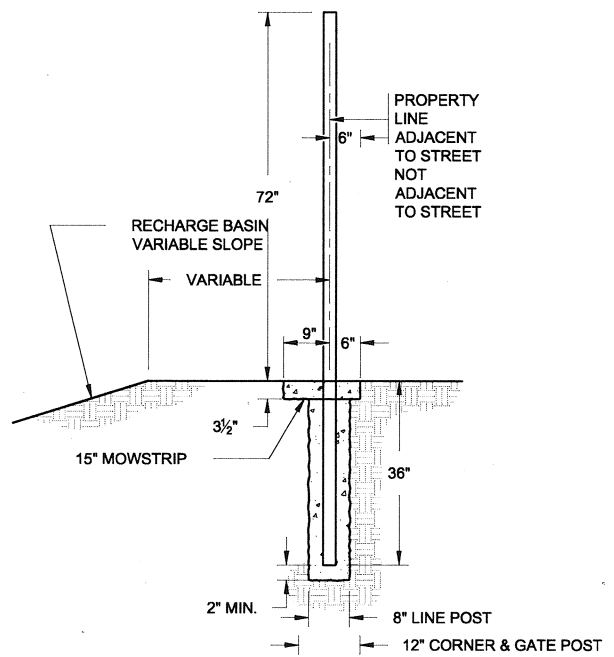
[Signature] 4-1-11
DISTRICT ENGINEER DATE

**ORNAMENTAL
METAL FENCE
4' WALK-IN GATE DETAILS**

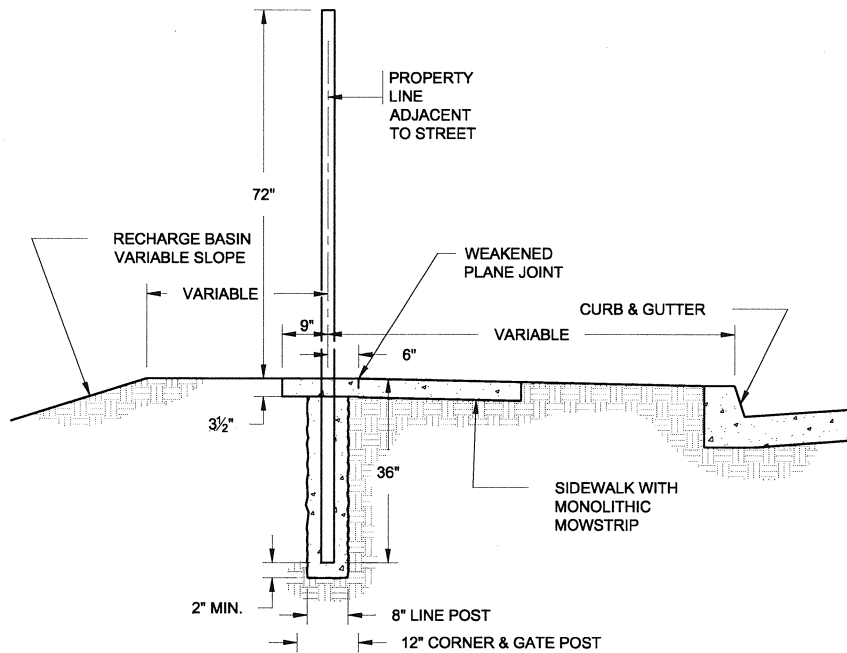
SCALE: AS SHOWN DRAWING No. E-6
SHEET 1 OF 1



FOOTING
SCALE: 1" = 3'



FOOTING & MOWSTRIP
SCALE: 1" = 3'



**FOOTING & SIDEWALK
W/ MONOLITHIC MOWSTRIP**
SCALE: 1" = 3'

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

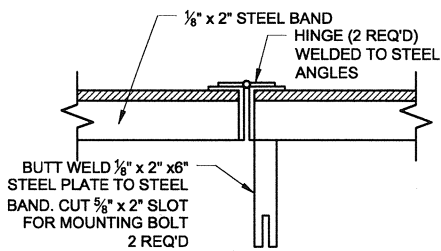
APPROVED BY:
[Signature]
DISTRICT ENGINEER

DATE: 4-1-11

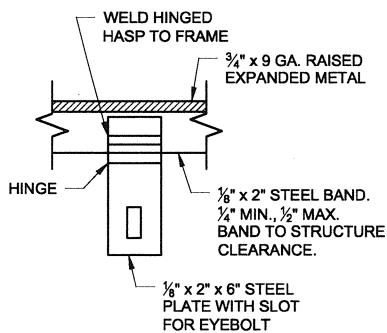
**FENCE PAD GRADING,
POST & MOWSTRIP LOCATION**

SCALE: AS SHOWN

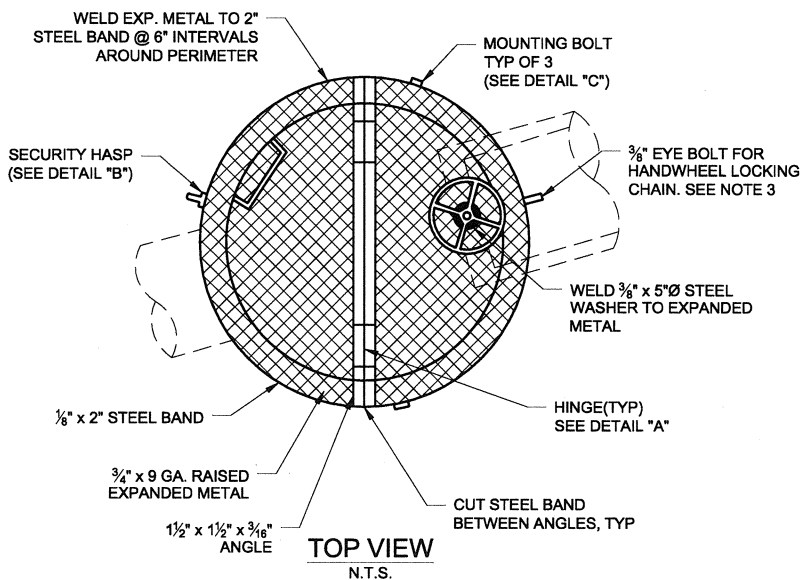
DRAWING No. E-7
SHEET 1 OF 1



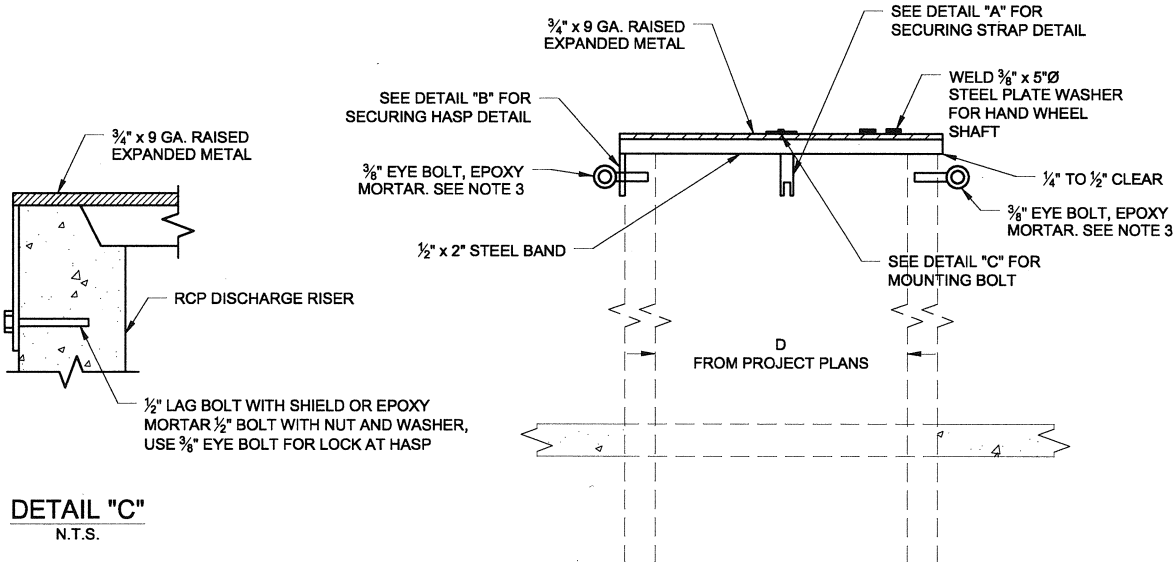
DETAIL "A"
N.T.S.



DETAIL "B"
N.T.S.



TOP VIEW
N.T.S.



SIDE VIEW
N.T.S.

NOTES:

1. THE DIAMETER OF THE COVER SHALL BE DETERMINED FROM THE PROJECT PLANS
2. ALL METAL SHALL BE GALVANIZED. THE COVER AND FRAME ASSEMBLY SHALL BE HOT-DIP GALVANIZED AFTER ASSEMBLY.
3. EYE BOLT FOR LOCKING HANDWHEEL AND SECURING HASP SHALL BE INCLUDED AS PART OF STRUCTURE COVER INSTALLATION.
4. LOCKS WILL BE PROVIDED BY THE DISTRICT.

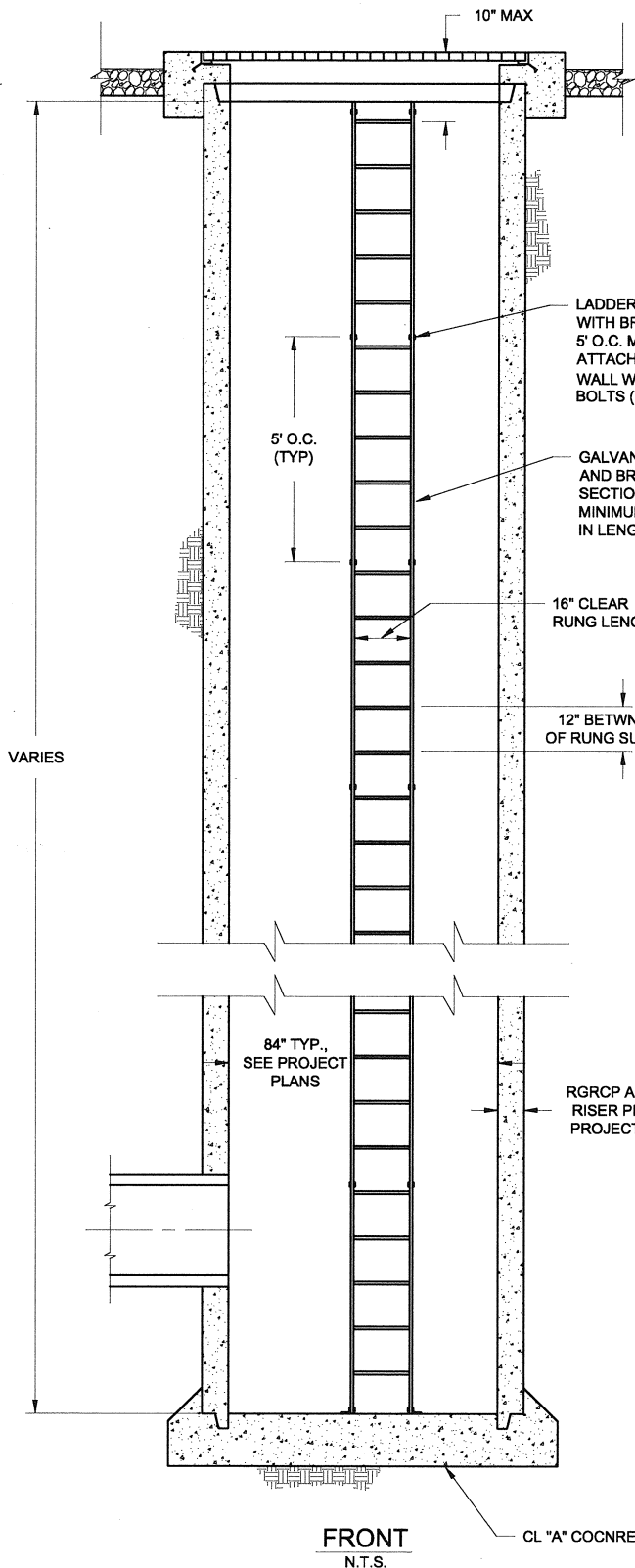
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

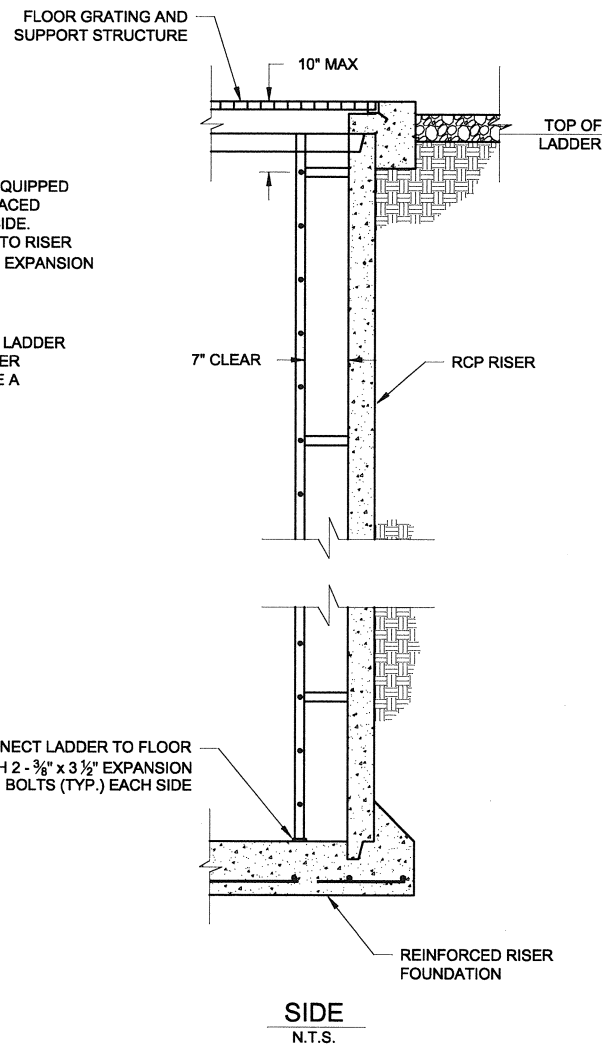
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**PUMP DISCHARGE
STRUCTURE COVER**

SCALE AS SHOWN DRAWING No. F-1
SHEET 1 OF 1



FRONT
N.T.S.



SIDE
N.T.S.

LADDER SHALL BE EQUIPPED WITH BRACKETS SPACED 5' O.C. MAX., EACH SIDE. ATTACH BRACKETS TO RISER WALL WITH 3/8" x 3 1/2" EXPANSION BOLTS (TYP.)

GALVANIZED STEEL LADDER AND BRACES. LADDER SECTIONS SHALL BE A MINIMUM OF 10' IN LENGTH

16" CLEAR RUNG LENGTH

12" BETWN. TOPS OF RUNG SURFACES

CONNECT LADDER TO FLOOR WITH 2 - 3/8" x 3 1/2" EXPANSION BOLTS (TYP.) EACH SIDE

84" TYP., SEE PROJECT PLANS

RGRCP ASTM C76 RISER PIPE PER PROJECT PLANS

NOTES

1. LADDER SHALL BE ALHAMBRA MODEL NO. A3885 OR APPROVED EQUAL.
2. LADDER, BRACES AND MOUNTING BRACKETS SHALL BE STEEL COMPLYING WITH ASTM A108-07 AND GALVANIZED PER ASTM A123 / A123M-09.
3. LADDER RUNGS SHALL BE SLIP RESISTENT.
4. LADDER SHALL BE LOCATED WITHIN THE SUMP AS SHOWN ON THE PROJECT PLANS.
5. LADDER TO CONFORM TO SECTION 26 OF THE FMFCD STANDARD SPECIFICATIONS.

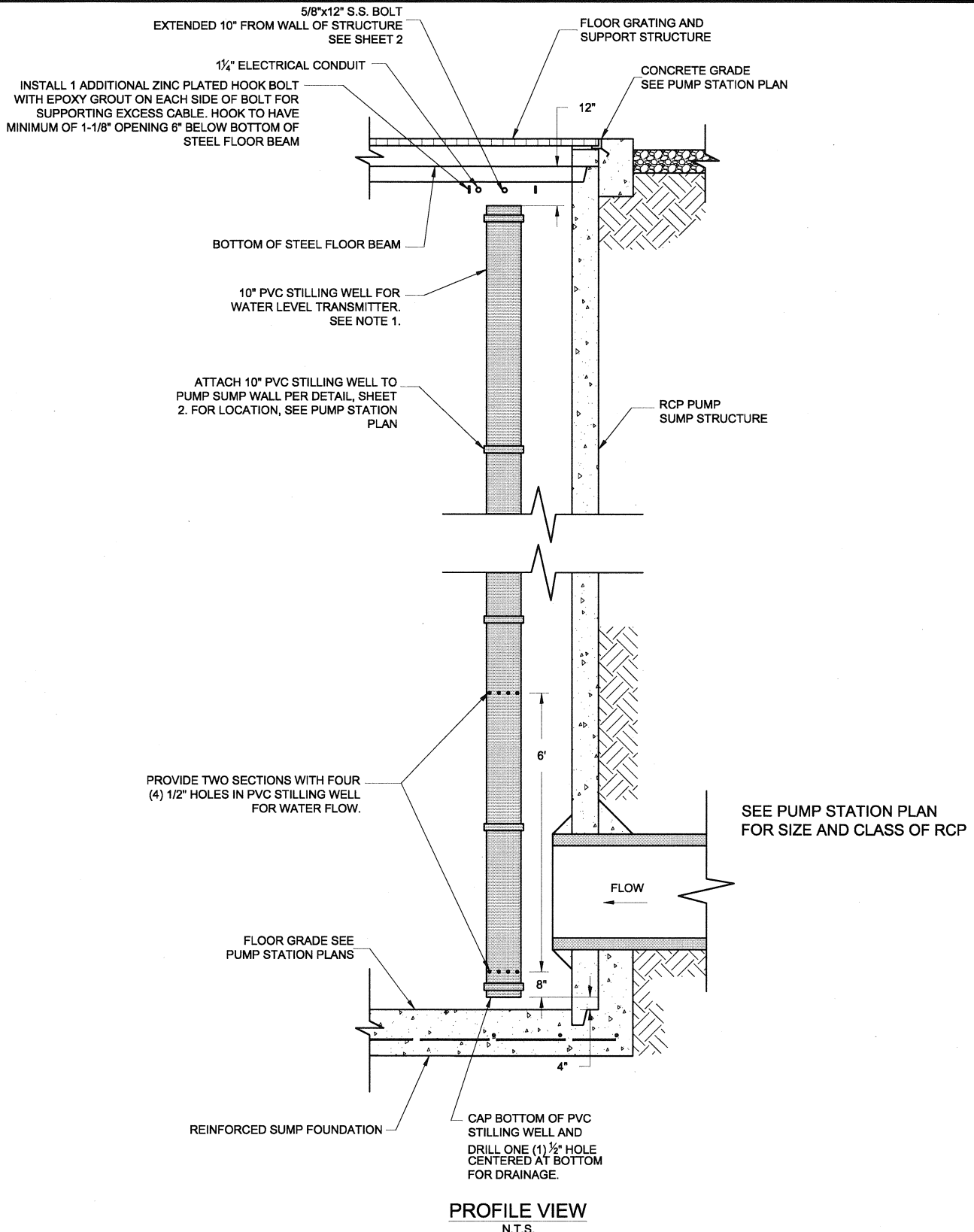
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

PUMP SUMP/ CONTROL STRUCTURE LADDER

SCALE AS SHOWN DRAWING No. F-2
SHEET 1 OF 1




PROFILE VIEW
N.T.S.

- NOTES:**
1. STILLING WELL SHALL BE PVC SCH. 40, 10" DIAMETER
 2. LENGTH OF STILLING WELL TO BE DETERMINED FROM PUMP STATION PLANS.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

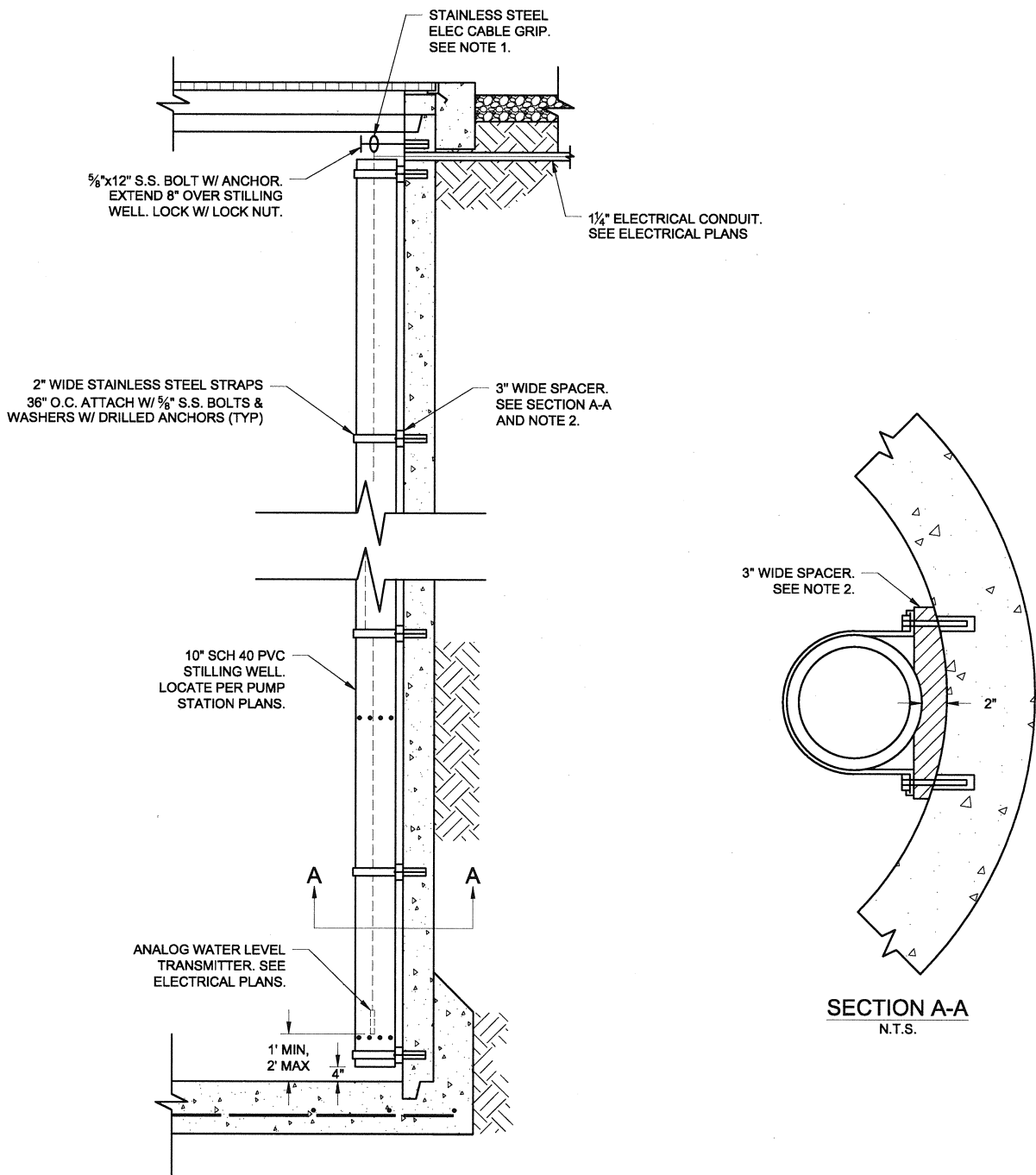
APPROVED BY:

 DISTRICT ENGINEER

4-1-11
DATE

**PUMP STATION
STILLING WELL**

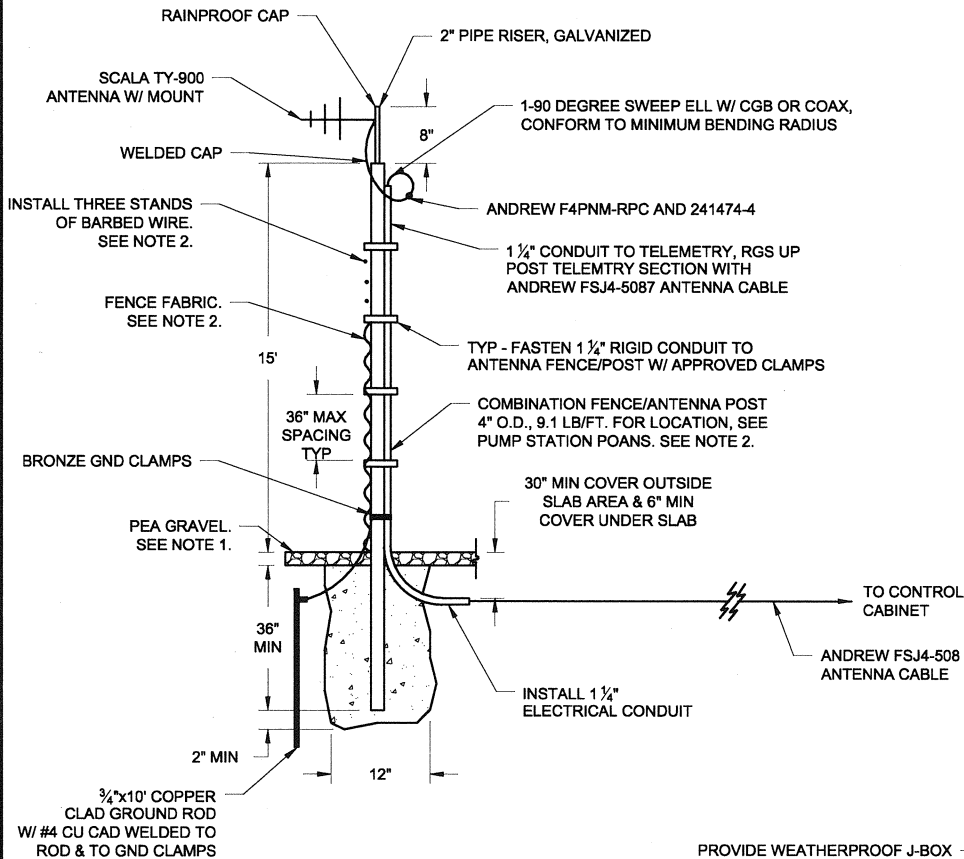
SCALE AS SHOWN

DRAWING No. F-3
SHEET 1 OF 2



- NOTES:**
- GRIP SHALL BE KELLUM STAINLESS STEEL OR APPROVED EQUAL.
 - SPACERS SHALL BE PRESSURE TREATED WOOD OR APPROVED EQUAL.

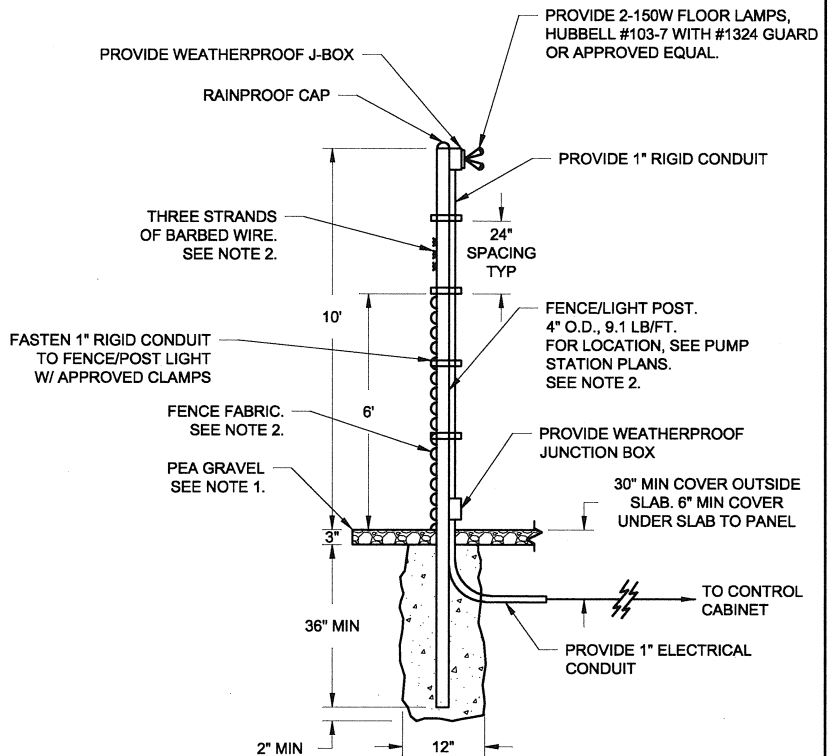
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	PUMP STATION STILLING WELL MOUNTING DETAILS & TRANSMITTER INSTALLATION	
MARK	DATE	DESCRIPTION		SCALE AS SHOWN	DRAWING No. F-3 SHEET 2 OF 2
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER	DATE 4-1-11	



TELEMETRY SYSTEM ANTENNA POLE
N.T.S.

NOTES:

1. FOR ACTUAL SURFACING AND LOCATION, SEE PUMP STATION PLANS.
2. ALL FENCE FABRIC, POSTS, & GATES SHALL COMPLY WITH SECTION 28, "CHAIN LINK FENCE AND GATES," OF THE FMFCD STANDARD SPECIFICATIONS AND TO FMFCD STANDARD PLANS.



PUMP STATION FLOOD LIGHT
N.T.S.

REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

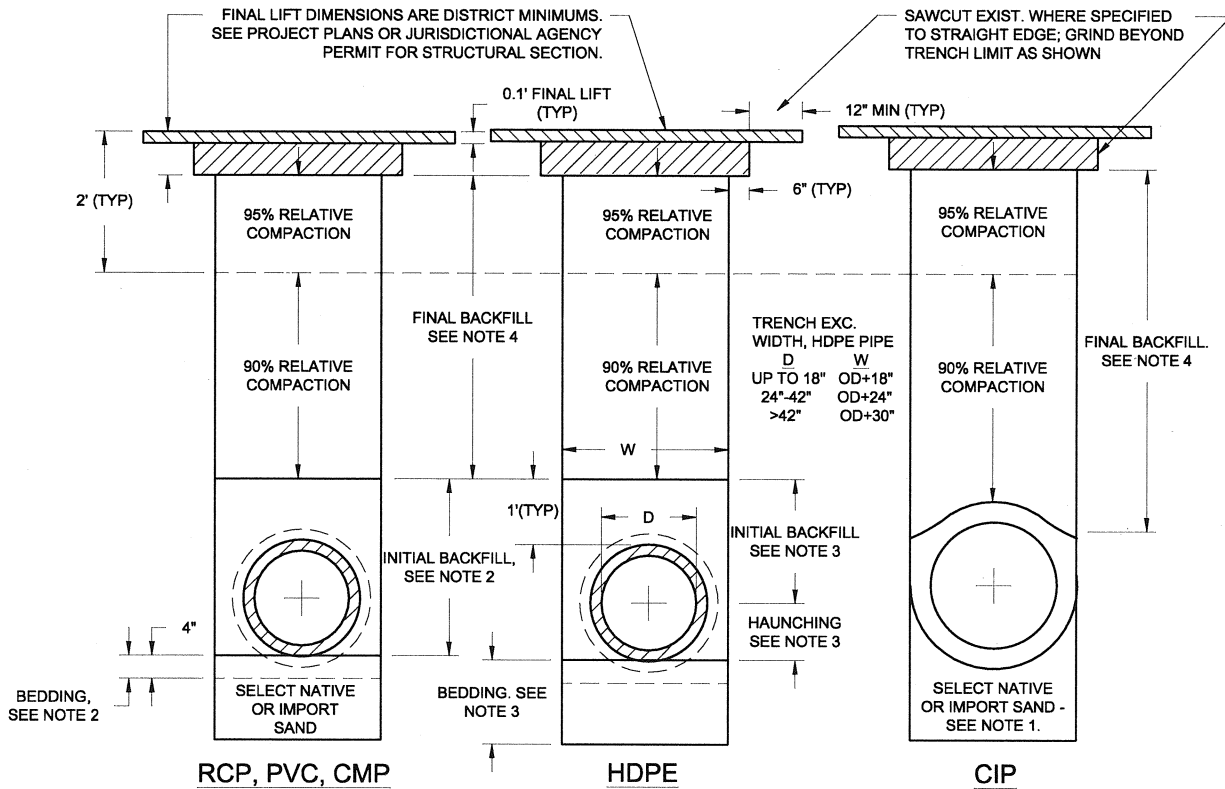
APPROVED BY:

[Signature] 4-1-11
DISTRICT ENGINEER DATE

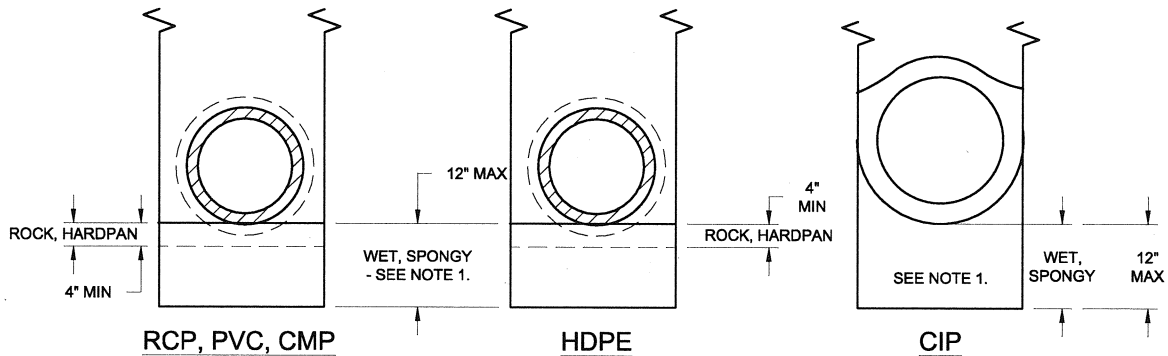
PUMP STATION FLOOD LIGHT TELEMETRY SYSTEM ANTENNA POLE

SCALE AS SHOWN

DRAWING No. F-4
SHEET 1 OF 1



BEDDING, BACKFILL REQUIREMENTS

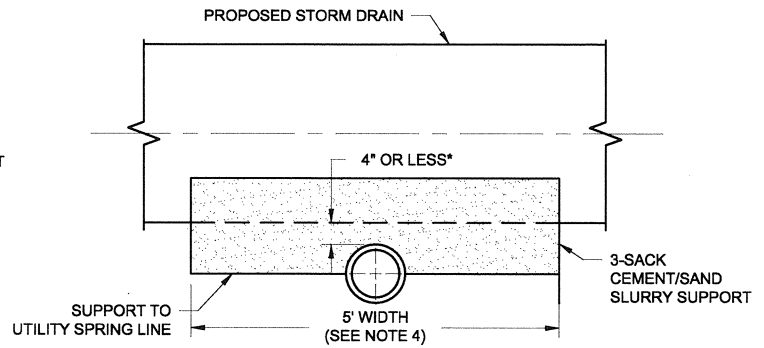
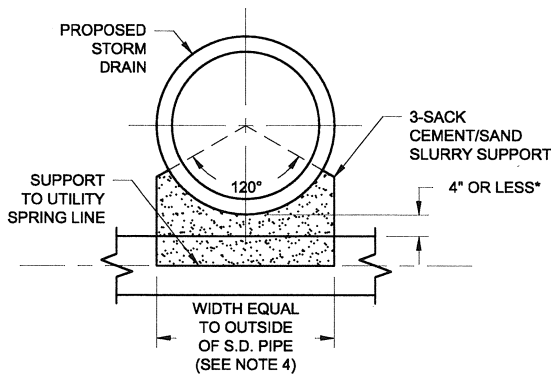


OVER-EXCAVATION REQUIREMENTS, UNSUITABLE-UNSTABLE TRENCH BOTTOM*
 *REFER SECTION 14-3, FMFCD STANDARD SPECIFICATIONS

NOTES:

1. *WHERE WET, SPONGY, OTHER UNSUITABLE MATERIAL ENCOUNTERED, OVER-EXCAVATE 12" AND BACKFILL AS SHOWN.
2. BEDDING AND INITIAL BACKFILL FOR RCP, PVC, CMP PIPE SHALL BE SELECT NATIVE SANDY MATERIAL, 8-INCH LIFTS, 90% COMPACTION. REFER TO FMFCD STANDARD SPECIFICATIONS.
3. BEDDING, HAUNCHING AND INITIAL BACKFILL HDPE PIPE SHALL BE CL. IA, IB, II, OR III PER A.S.T.M. D2321, 6-INCH LIFTS, 90% COMPACTION. REFER TO FMFCD STANDARD SPECIFICATIONS.
4. FINAL BACKFILL SHALL BE SELECT NATIVE MATERIAL, 8-INCH LIFTS UNLESS OTHERWISE APPROVED BY THE ENGINEER, 90% COMPACTION, EXCEPT TOP 2 FT. TO BE 95% COMPACTION.

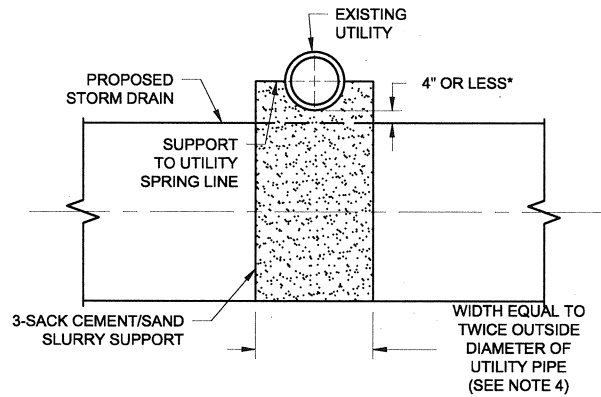
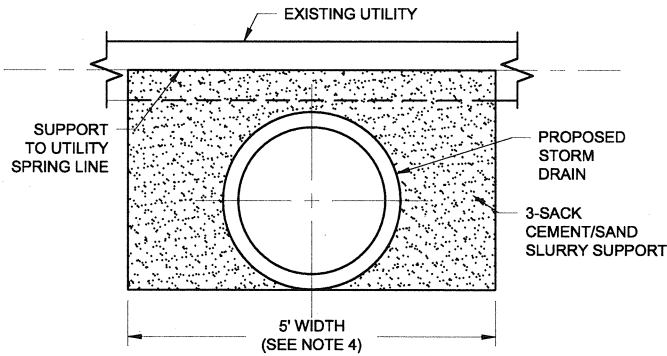
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TRENCH EXCAVATION, BACKFILL, SURFACE RESTORATION
MARK	DATE	DESCRIPTION		
			APPROVED BY:	SCALE AS SHOWN
			<i>[Signature]</i>	DRAWING No. <u>G-1</u>
ADOPTED	4/1/2011		DISTRICT ENGINEER	SHEET <u>1</u> OF <u>1</u>
			DATE <u>4-1-11</u>	



STORM DRAIN CROSSING OVER MUNICIPAL UTILITY WITH LESS THAN 4 INCHES OF CLEARANCE* BETWEEN OUTSIDE DIAMETERS

NOT TO SCALE

*WHERE PERMITTED BY THE LOCAL JURISDICTION UTILITY OWNER



STORM DRAIN CROSSING UNDER MUNICIPAL UTILITY WITH LESS THAN 4 INCHES OF CLEARANCE* BETWEEN OUTSIDE DIAMETERS

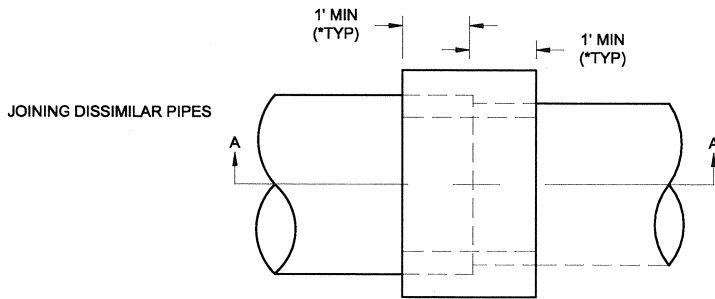
NOT TO SCALE

*WHERE PERMITTED BY THE LOCAL JURISDICTION UTILITY OWNER

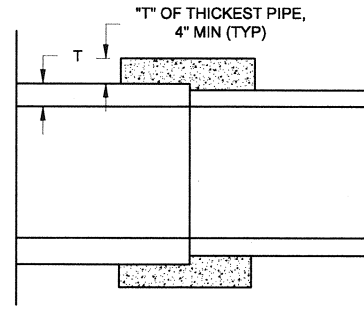
NOTES:

1. THIS MUNICIPAL UTILITY (SEWER, WATER, RECLAIMED WATER, ETC.) CROSSING DETAIL IS FOR UTILITY MAINLINES ONLY, AND NOT INTENDED FOR SERVICE LATERALS.
2. SLURRY SUPPORT IS TO BE PLACED ONLY ON FIRM, UNDISTURBED SOIL. SLURRY TO BE 3-SACK CEMENT/SAND MIX.
3. WHERE SEPARATION BETWEEN S.D. AND UTILITY EXCEEDS 4", IF SOIL IS DISTURBED BETWEEN THE S.D. AND UTILITY, THIS CROSSING DETAIL SHALL BE USED UP TO A SEPARATION DISTANCE THAT CAN BE COMPACTED BY HAND-OPERATED EQUIPMENT.
4. WHERE A JOINT IN THE UTILITY OCCURS AT THE EDGE OF THE SLURRY SUPPORT, EXTEND SUPPORT 6" MIN BEYOND THE JOINT.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	STORM DRAIN CROSSING OVER/UNDER MUNICIPAL UTILITY	
MARK	DATE	DESCRIPTION			
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER	SCALE: AS SHOWN	DRAWING No. G-2 SHEET 1 OF 1

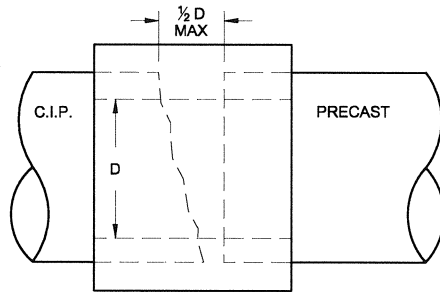


N.T.S.



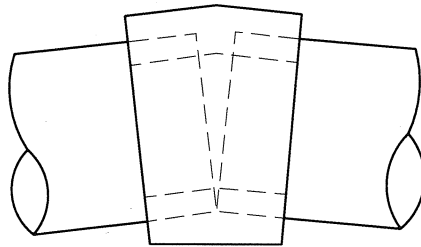
SECTION "A-A"
TYPICAL ALL JOINTS
N.T.S.

JOINING CAST-IN-PLACE TO
PRE-CAST PIPE



N.T.S.

FORMING ANGLE EXCEEDING
MFR'S NORMAL DEFLECTION
ANGLE, REQUIRES ENGINEERS
APPROVAL. SEE NOTE 4

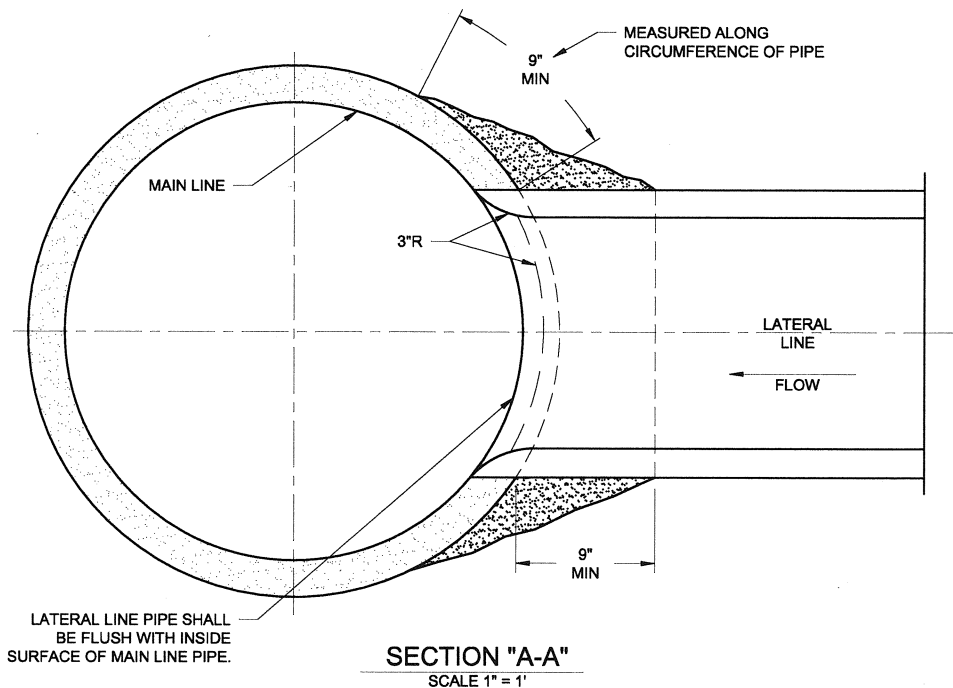


N.T.S.

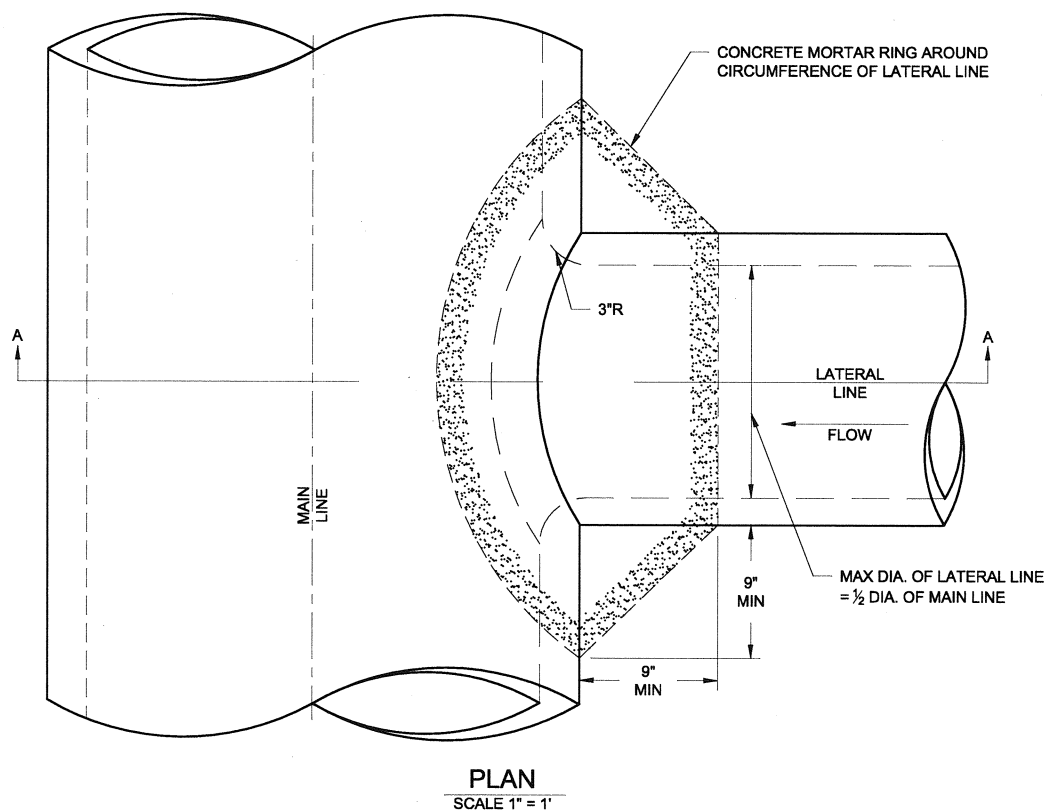
NOTES:

1. CONCRETE COLLAR SHALL BE CLASS A CONCRETE.
2. INSIDE OF COLLAR SHALL MATCH PIPE DIAMETER, SMOOTH STEEL TROWEL FINISH.
3. ALLOW CONCRETE TO HARDEN BEFORE BACKFILLING.
4. WHEN FORMING ANGLES ENGINEER MAY REQUIRE CHAMFERING OF PIPE ENDS.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	CONSTRUCTION JOINT CONCRETE FIELD COLLAR	
MARK	DATE	DESCRIPTION		SCALE AS SHOWN	DRAWING No. <u>G-3</u> SHEET <u>1</u> OF <u>1</u>
			APPROVED BY: <i>James A. Homan</i> DISTRICT ENGINEER	DATE 4-1-11	
ADOPTED		4/1/2011			



LATERAL LINE PIPE SHALL BE FLUSH WITH INSIDE SURFACE OF MAIN LINE PIPE.



REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

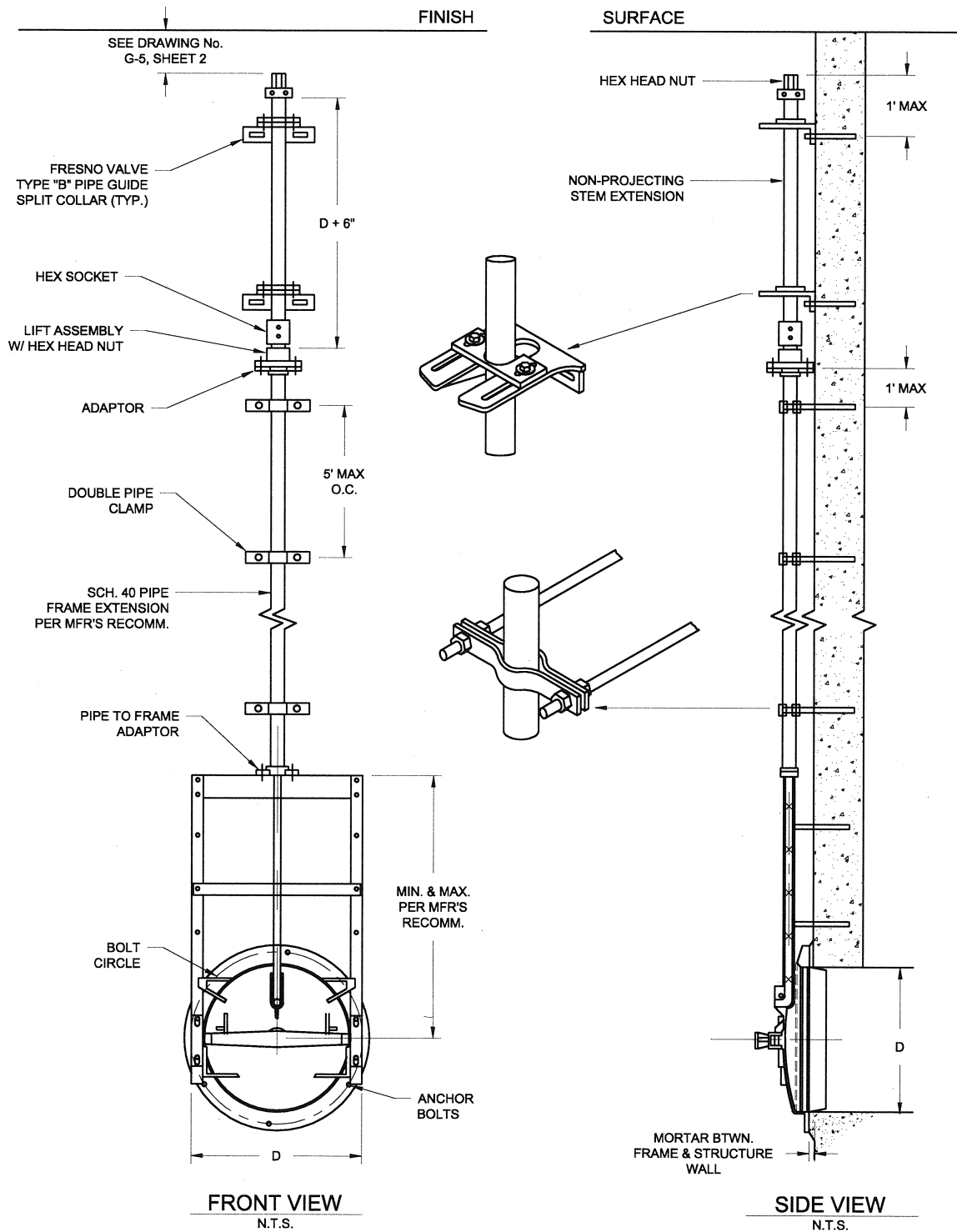
APPROVED BY:
[Signature]
 DISTRICT ENGINEER

4-1-11
 DATE

LATERAL LINE CONNECTION WITHOUT MANHOLE

SCALE AS SHOWN

DRAWING No. G-4
 SHEET 1 OF 1



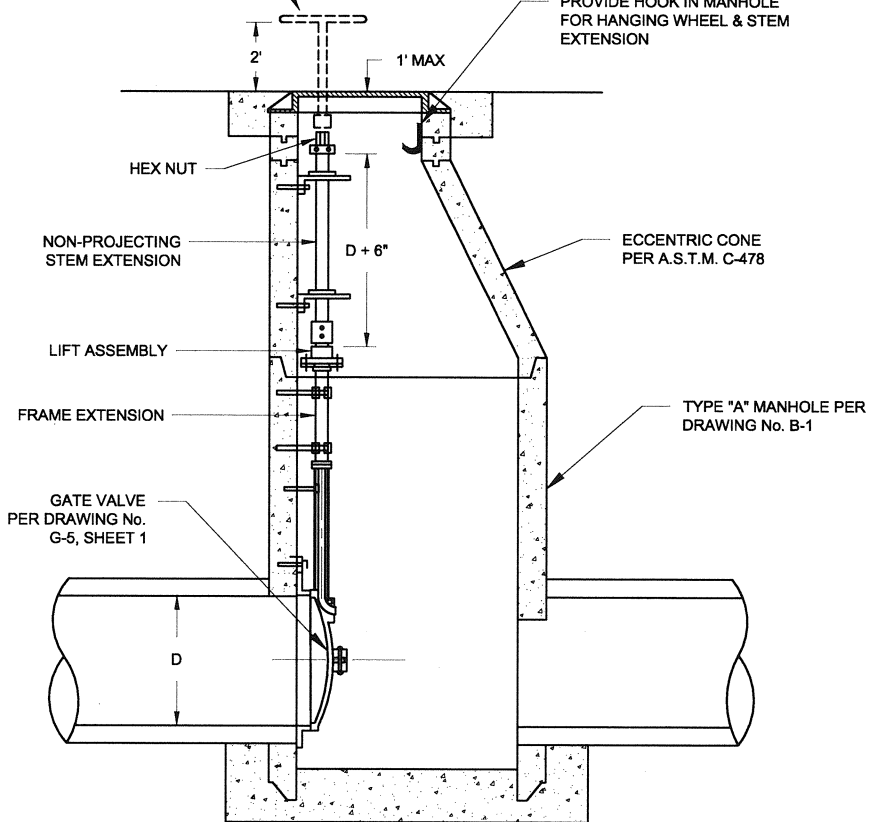
NOTES:

1. GATE VALVE SHALL BE FRESNO VALVES AND CASTINGS SERIES 6400, MODEL 20-10 C, NON-PROJECTING STEM, WATERMAN INDUSTRIES MODEL C-20, NON-RISING STEM, OR APPROVED EQUAL. SIZE AS SHOWN ON THE PROJECT PLANS.
2. INSTALLATION SHALL COMPLY WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL MOVING PARTS SHALL BE LUBRICATED PER MANUFACTURER'S RECOMMENDATIONS.
4. ALL METAL PARTS SHALL BE GALVANIZED.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT		GATE VALVE W/ NON-PROJECTING STEM	
MARK	DATE	DESCRIPTION	APPROVED BY:		TYPE "A" STEM EXTENSION BELOW FINISH GRADE	
					SCALE AS SHOWN	DRAWING No. <u>G-5</u> SHEET <u>1</u> OF <u>3</u>
ADOPTED		4/1/2011	DISTRICT ENGINEER		DATE <u>4-1-11</u>	

PROVIDE MFR'S RECOMMENDED
HAND WHEEL WITH EXTENSION
& COUPLING SUCH THAT GATE
VALVE MAY BE OPENED FROM
THE STREET SURFACE

PROVIDE HOOK IN MANHOLE
FOR HANGING WHEEL & STEM
EXTENSION



TYPICAL MANHOLE APPLICATION


N.T.S.

NOTES:

1. GATE VALVE, FRAME EXTENSION, LIFT ASSEMBLY, NON-PROJECTING STEM EXTENSION, CLAMPS, AND ALL APPURTENANCES SHALL BE AS SHOWN ON DRAWING No. G-5, SHEET 1.
2. INSTALLATION SHALL COMPLY WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL MOVING PARTS SHALL BE LUBRICATED PER MANUFACTURER'S RECOMMENDATIONS.
4. ALL METAL PARTS SHALL BE GALVANIZED.
5. HAND WHEEL AND EXTENSION SHALL BE INCLUDED IN THE COST OF FURNISHING AND INSTALLING VALVE.

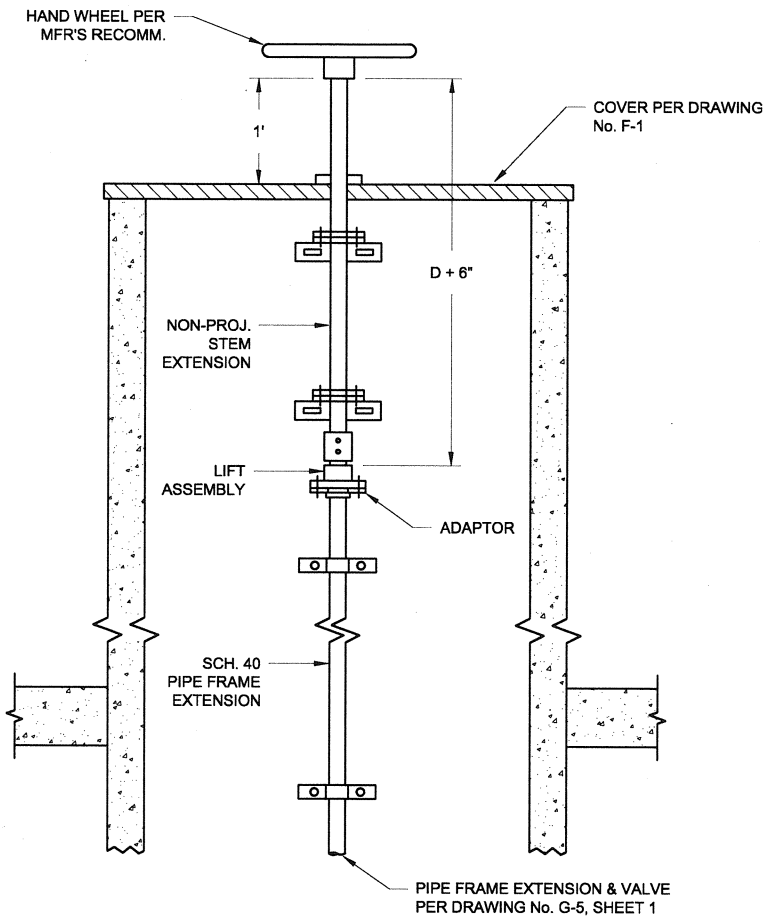
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

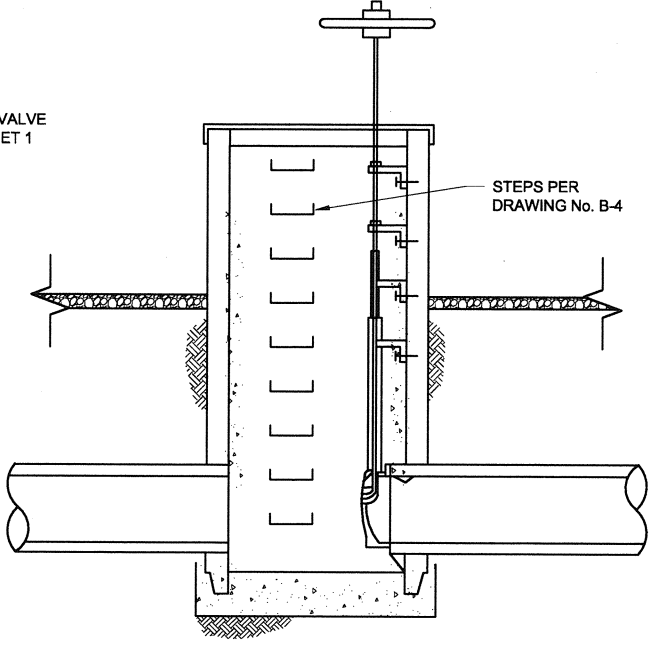
APPROVED BY:

 DISTRICT ENGINEER DATE 4-1-11

**GATE VALVE
W/ NON-PROJECTING STEM
TYPE "A" STEM EXTENSION
BELOW FINISH GRADE**

SCALE AS SHOWN DRAWING No. G-5
SHEET 2 OF 3



**TYPE "B" - STEM EXTENSION
ABOVE FINISH GRADE**
N.T.S.

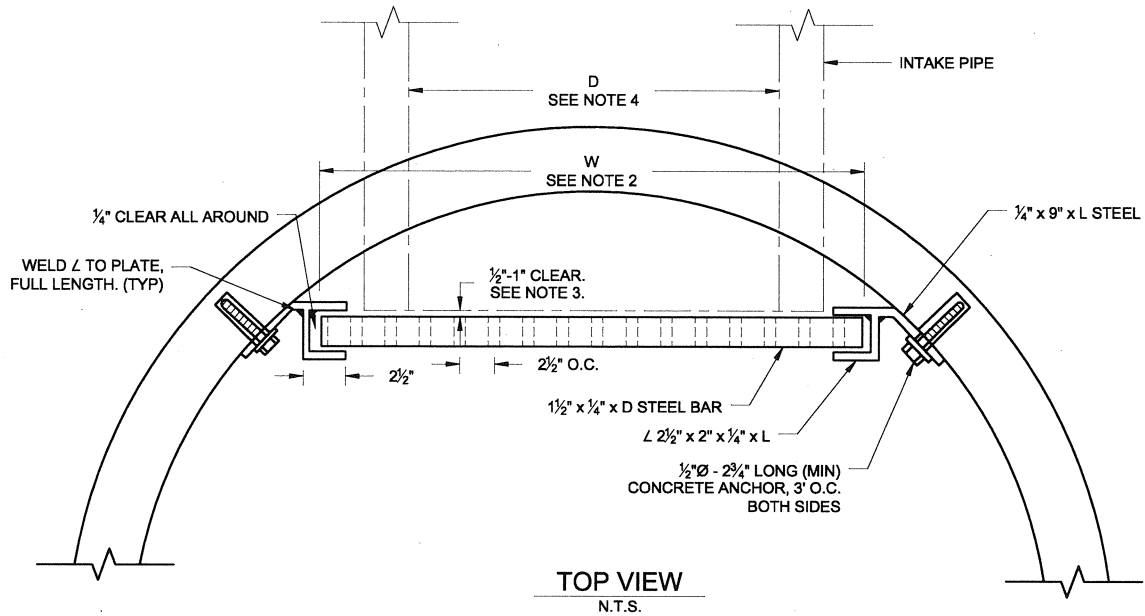


**TYPICAL DISCHARGE
STRUCTURE APPLICATION**
N.T.S.

NOTES:

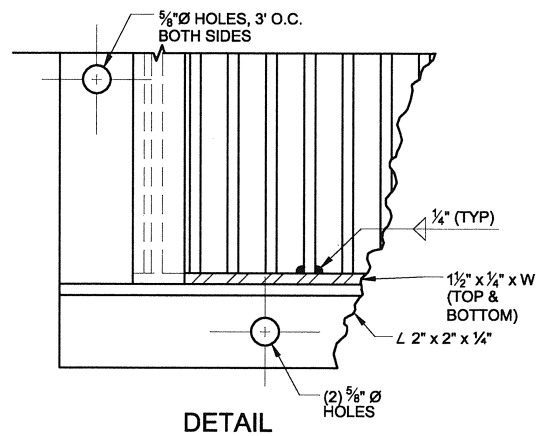
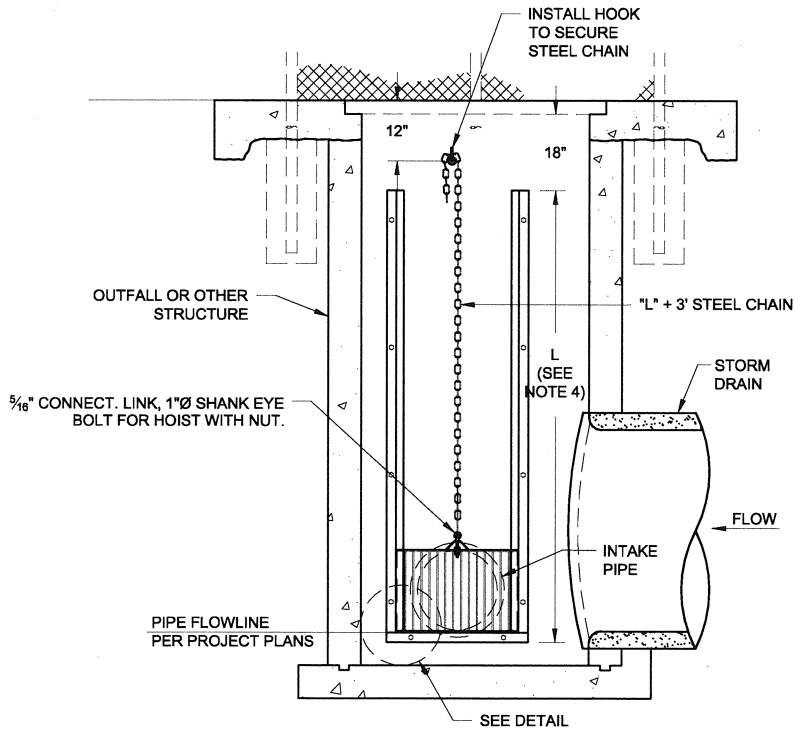
1. GATE VALVE, FRAME EXTENSION, LIFT ASSEMBLY, NON-PROJECTING STEM EXTENSION, CLAMPS, AND ALL APPURTENANCES SHALL BE AS SHOWN ON DRAWING No. G-5, SHEET 1.
2. INSTALLATION SHALL COMPLY WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL MOVING PARTS SHALL BE LUBRICATED PER MANUFACTURER'S RECOMMENDATIONS.
4. ALL METAL PARTS SHALL BE GALVANIZED.
5. HAND WHEEL AND EXTENSION SHALL BE INCLUDED IN THE COST OF FURNISHING AND INSTALLING VALVE.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT		GATE VALVE W/ NON-PROJECTING STEM	
MARK	DATE	DESCRIPTION			TYPE "B" STEM EXTENSION ABOVE FINISH GRADE	
ADOPTED	4/1/2011		APPROVED BY: <i>[Signature]</i> DISTRICT ENGINEER		SCALE AS SHOWN	DRAWING No. <u>G-5</u> SHEET <u>3</u> OF <u>3</u>
			DATE: <u>4-1-11</u>			




NOTES:

1. ALL METAL PARTS SHALL BE GALVANIZED AFTER FABRICATION.
2. GRATE WIDTH "W" SHALL BE A MINIMUM OF THE OUTSIDE PIPE DIAMETER PLUS 5 INCHES, OR SUCH OTHER AMOUNT TO OBTAIN STABLE MOUNTING ON STRUCTURE WALL.
3. TO PROVIDE THE NOTED CLEARANCE BETWEEN PIPE AND RACK, INTAKE PIPE SHALL BE SHORTENED BY CHIPPING AND MORTARING TO PROVIDE SMOOTH EDGE, OR LENGTHENED BY USE OF AN APPROVED EXTENSION ADAPTOR OR SPIGOT.
4. LENGTH "L" AND PIPE DIAMETER "D" SHALL BE DETERMINED FROM THE PROJECT PLANS.



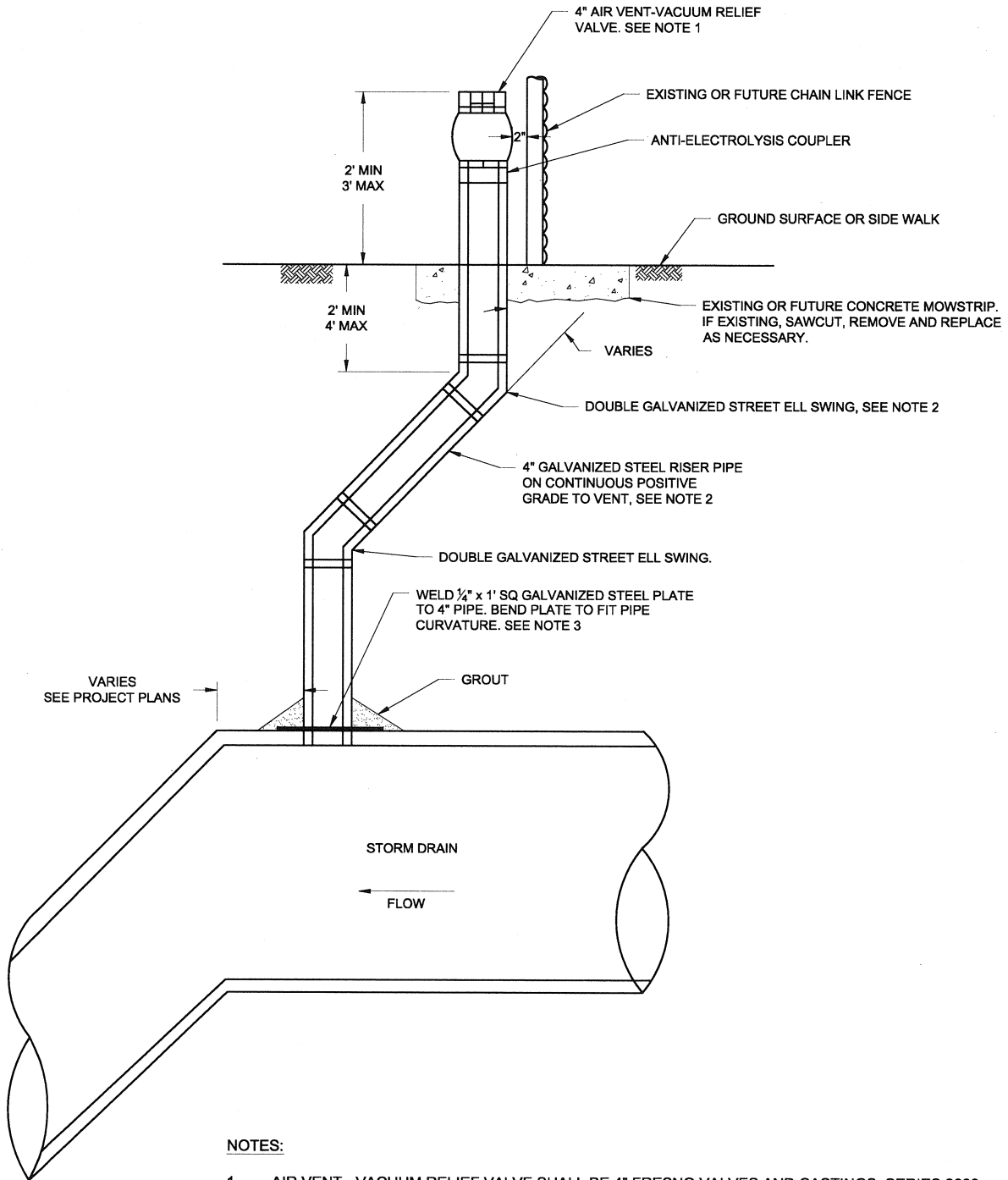
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

APPROVED BY:

 DISTRICT ENGINEER 4-1-11 DATE

TRASH RACK

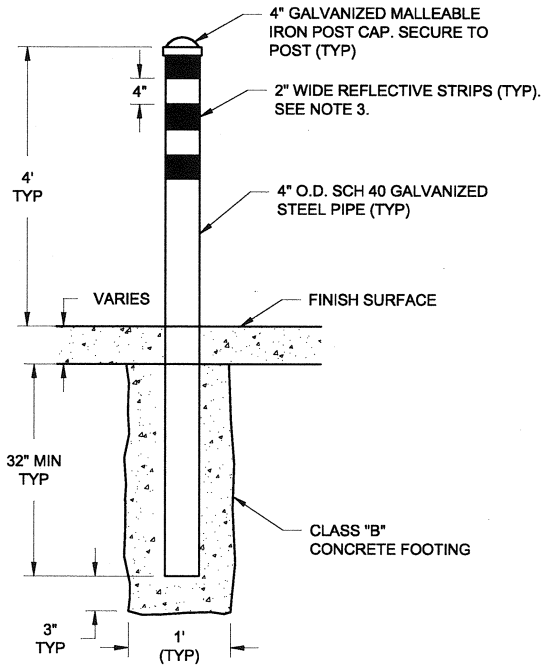
SCALE AS SHOWN DRAWING No. G-6
 SHEET 1 OF 1



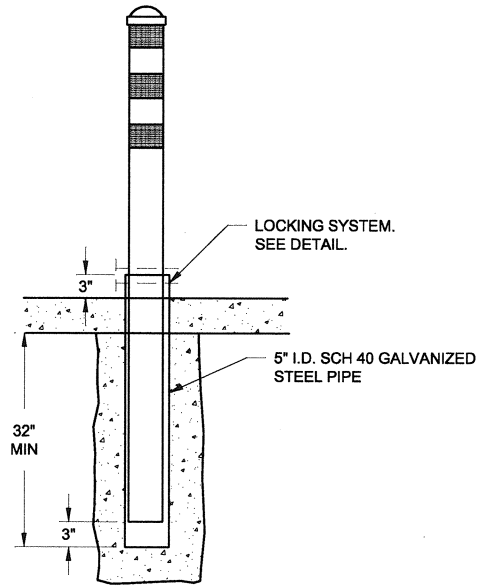
NOTES:

1. AIR VENT - VACUUM RELIEF VALVE SHALL BE 4" FRESNO VALVES AND CASTINGS, SERIES 3000 OR APPROVED EQUAL.
2. VALVE AND ALL PIPE AND FITTINGS SHALL HAVE NATIONAL PIPE THREAD.
3. PLATE WELD SHALL BE PAINTED WITH 2 COATS OF ZINC OXIDE/ZINC DUST PAINT.
4. THE COST OF ALL PIPE, FITTINGS, PLATE, REMOVAL/REPLACEMENT OF MOWSTRIP, BACKFILL AND COMPACTION, AND ALL NECESSARY WORK SHALL BE INCLUDED IN THE PRICE FOR FURNISHING AND INSTALLING THE VALVE.

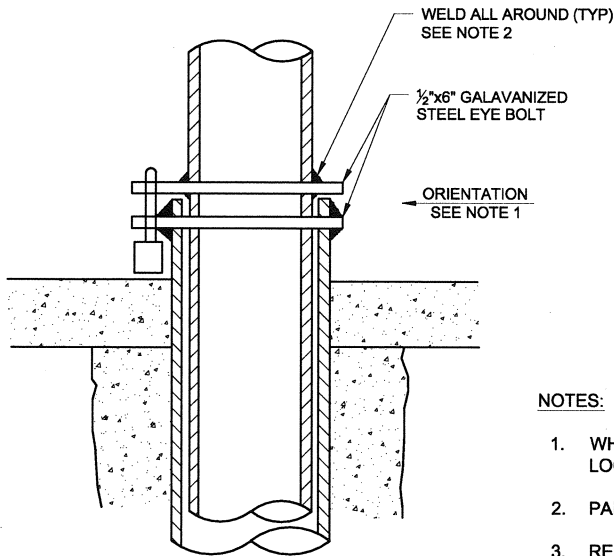
REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	4" AIR VENT - VACUUM RELIEF VALVE	
MARK	DATE	DESCRIPTION		SCALE AS SHOWN	DRAWING No. <u>G-7</u> SHEET <u>1</u> OF <u>1</u>
ADOPTED	4/1/2011		APPROVED BY: DISTRICT ENGINEER	DATE 4-1-11	



FIXED POST



REMOVABLE POST



LOCKING SYSTEM DETAIL

NOTES:

1. WHERE GUARD POST IS LOCATED IN A TRAVELED PATH, ORIENT LOCKING SYSTEM EYE BOLTS PARALLEL TO TRAVEL DIRECTION.
2. PAINT WELD WITH 2 COATS OF ZINC OXIDE/ZINC DUST PAINT.
3. REFLECTIVE STRIPS SHALL BE YELLOW ADHESIVE, PACIFIC UTILITIES #PEM212F OR ALMETEK #DL-RY2X12-A OR APPROVED EQUAL.
4. CONTRACTOR SHALL CONTACT JURISDICTIONAL AGENCY FOR LOCATION WITHIN PUBLIC RIGHT OF WAY.

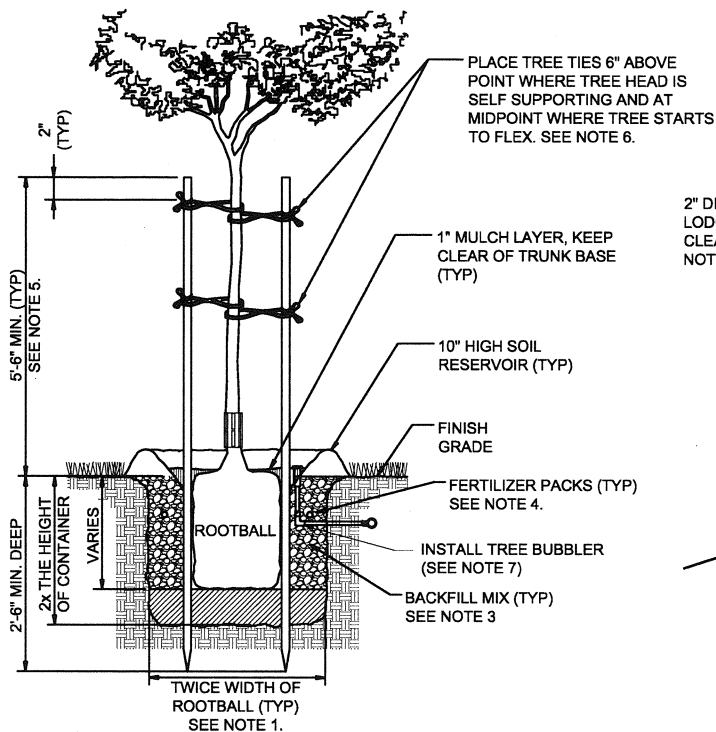
REVISIONS		
MARK	DATE	DESCRIPTION
ADOPTED	4/1/2011	

**FRESNO METROPOLITAN
FLOOD CONTROL DISTRICT**

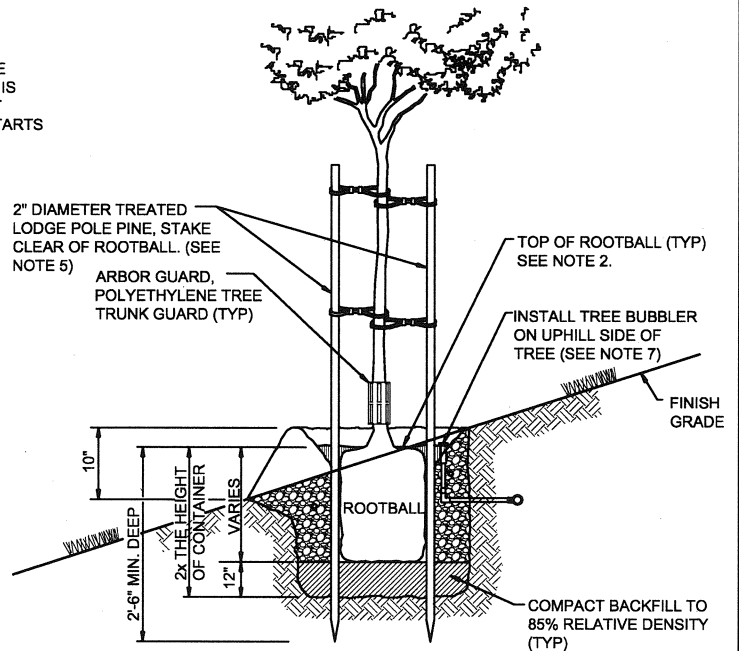
APPROVED BY: *[Signature]* 4-1-11
DISTRICT ENGINEER DATE

**STEEL GUARD POST
FIXED & REMOVABLE**

SCALE AS SHOWN DRAWING No. G-8
SHEET 1 OF 1



TYPICAL TREE PLANTING DETAIL
NOT TO SCALE

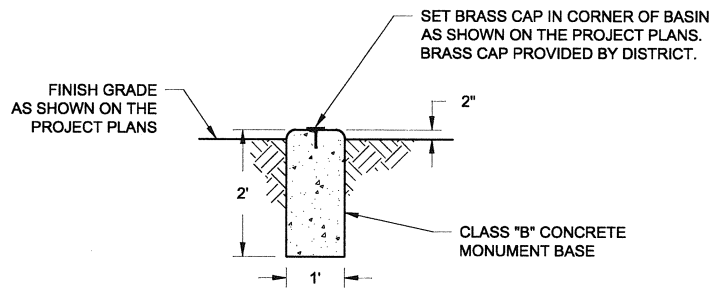
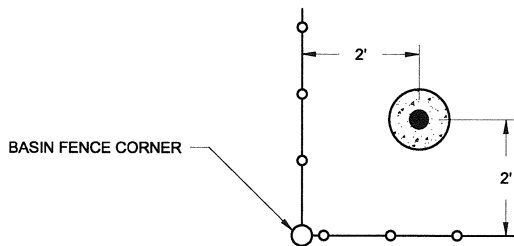


TYPICAL TREE PLANTING ON BASIN SLOPE DETAIL
NOT TO SCALE

NOTES:

1. DIG PLANTING HOLE TWICE THE DIAMETER OF THE ROOTBALL. IF IMPERVIOUS MATERIAL IS ENCOUNTERED, AUGER 24" DIAMETER DRAINAGE HOLE FROM BOTTOM OF TREE WELL TO PERVIOUS STRATA AS DIRECTED BY THE ENGINEER. BACKFILL WITH PERVIOUS SANDY SOIL.
2. SET TREE WITH TOP OF ROOTBALL APPROXIMATELY 1" ABOVE PLANTING GRADE. IF NECESSARY, ADJUST BOTTOM OF HOLE WITH BACKFILL MIX TO RAISE ROOTBALL. SCORE SIDES OF ROOTBALL APPROXIMATELY 1" DEEP TO PREVENT CIRCLING ROOTS.
3. FILL PLANTING HOLE TO PLANTING GRADE WITH BACKFILL MIX COMPOSED OF SOIL AMENDMENT AND APPROVED TOP SOIL. MIX RATIO PER MFR'S RECOMMENDATION. COMPACT LIGHTLY. SEE FMCD STANDARD SPECIFICATIONS SECTION 31-4.02 AND 31-8.
4. ADD FERTILIZER PACKS AT 1/2 DEPTH OF BACKFILL MIX. PACKS SHALL COMPLY WITH SECTION 31-4.03(A) AND 31-8.01.1 OF FMCD STANDARD SPECIFICATIONS.
5. FOR DECIDUOUS TREES, DRIVE 2-8' TREE STAKES, 1 SW AND 1 NE OF TREE. STAKES SHOULD BE 12" FROM TREE AND SET WITH TOP BELOW CROWN OF TREE FOR CONIFERS, DRIVE 1-8' STAKE NW OF TREE. 10' STAKES REQUIRED WHERE SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
6. SUPPORT TREE USING WORLDWIDE OR WONDER TREE V.I.T. TREE TIE STRAPS OR APPROVED EQUAL, NAILED TO TREE STAKES.
7. INSTALL IRRIGATION FACILITIES AS SHOWN ON THE PROJECT PLANS AND PER SECTION 30 OF THE FMCD STANDARD SPECIFICATIONS.
8. TREE PLANTING SHALL COMPLY WITH SECTION 31 OF THE FMCD STANDARD SPECIFICATIONS.

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	TREE PLANTING WELL	
MARK	DATE	DESCRIPTION			
			APPROVED BY:		
			<i>[Signature]</i>	4-1-11	
			DISTRICT ENGINEER	DATE	
ADOPTED	4/1/2011			SCALE AS SHOWN	DRAWING No. G-9 SHEET 1 OF 1



**BASIN ELEVATION
MONUMENT DETAIL**

REVISIONS			FRESNO METROPOLITAN FLOOD CONTROL DISTRICT	RETENTION BASIN ELEVATION MONUMENT	
MARK	DATE	DESCRIPTION			
			APPROVED BY:	SCALE AS SHOWN	DRAWING No. <u>G-10</u> SHEET <u>1</u> OF <u>1</u>
ADOPTED	4/1/2011		<i>[Signature]</i> DISTRICT ENGINEER	4-1-11 DATE	