

CITY OF VALLEJO



**STANDARD SPECIFICATIONS
and
STANDARD DRAWINGS**

Adopted: December 20, 2011

INDEX OF REVISIONS

DATE REV

Part A	STANDARD SPECIFICATIONS	
SECTION 1.	GENERAL	
1.1	General Provisions	
1.1.1	Purpose	
1.1.2	Definition of Terms	
1.1.3	Application	
1.1.4	Control of Work	
1.1.5	Control of Materials	
1.1.6	Legal Relations and Responsibility	
1.1.7	Construction Plans	
1.1.8	Hours of Work	
1.1.9	As-Built Drawings	
1.1.10	Warranty Bond	
1.1.11	Pre-construction Meeting	
1.2	Special Procedures for City Funded / Administered Projects	
1.2.1	Proposal Requirements and Conditions	
1.2.2	Award and Execution of Contract	
1.2.3	Payment	
1.2.4	Scope of Work	
1.2.5	Prosecution and Progress	
SECTION 2.	EARTHWORK	
2.1	General	9/13/2011
2.1.1	Regulatory	9/13/2011
2.1.2	Definitions	9/13/2011
2.2	Permits Required	9/13/2011
2.2.1	Grading Permits	9/13/2011
2.2.2	Purpose and intent	9/13/2011
2.2.3	Grading permit, drainage alteration	9/13/2011
2.2.4	Excavation blasting permit	9/13/2011
2.2.5	Types of grading permits	9/13/2011
2.2.6	Discharge of Storm Water Associated with Construction Activity	9/13/2011
2.3	Grading Permit Requirements	9/13/2011
2.3.1	Permits required	9/13/2011
2.3.2	Application	9/13/2011
2.3.3	Grading permit application	9/13/2011
2.3.4	Grading plan clearances	9/13/2011
2.3.5	Grading plan	9/13/2011
2.3.6	Interim Grading Permit	9/13/2011
2.3.7	Land Grading Permit	9/13/2011
2.3.8	Grading Plan Correction	9/13/2011
2.4	Soil and Engineering Geology Report Content	9/13/2011
2.4.1	Investigative Soil Report	9/13/2011
2.4.2	Investigative Engineering Geology Report	9/13/2011
2.4.3	Seismicity and Liquefaction Reports	9/13/2011
2.4.4	Monthly Progress Soils Report	9/13/2011
2.5	Permit Issuance	9/13/2011
2.5.1	Time of grading operations	9/13/2011
2.5.2	Responsibility of permittee	9/13/2011

INDEX OF REVISIONS

		DATE REV
2.5.3	Protection of adjoining property	9/13/2011
2.5.4	Import and export of earth material	9/13/2011
2.5.5	Topsoil	9/13/2011
2.5.6	Spoils	9/13/2011
2.5.7	Dust control	9/13/2011
2.5.8	Permit Expiration	9/13/2011
2.6	Completion and Acceptance of Work	9/13/2011
2.6.1	Final Reports	9/13/2011
2.6.2	Notification of Completion	9/13/2011
2.6.3	Final Reports	9/13/2011
2.7	Grading Inspection	9/13/2011
2.7.1	General	9/13/2011
2.7.2	Grading Requirements	9/13/2011
2.7.3	Notification of Noncompliance	9/13/2011
2.7.4	Transfer of Responsibility for Approval	9/13/2011
2.8	Site Inspections by Department	9/13/2011
2.8.1	Pregrade Meeting	9/13/2011
2.8.2	Notification	9/13/2011
2.8.3	Excavation and Fill Inspection ³⁰	9/13/2011
2.8.4	Concrete V-Ditch	9/13/2011
2.8.5	Other Drainage Devices	9/13/2011
2.8.6	Retaining Walls	9/13/2011
2.8.7	Rough Grade Inspection	9/13/2011
2.8.8	Final Inspection	9/13/2011
2.8.9	Siltation Control Facilities (Rainy Season: October 15 - April 15)	9/13/2011
2.9	Embankment Standards	9/13/2011
2.9.1	Cut Slopes	9/13/2011
2.9.2	Fill Location	9/13/2011
2.9.3	Compaction	9/13/2011
2.9.4	Slope	9/13/2011
2.9.5	Terrace	9/13/2011
2.9.6	Subsurface Drainage	9/13/2011
2.9.7	Disposal of Surface and Subsurface Drainage	9/13/2011
2.9.8	Interceptor Ditch	9/13/2011
2.9.9	Retaining Walls	9/13/2011
2.1	Erosion Control	9/13/2011
2.10.1	Erosion Control System	9/13/2011
2.10.2	Erosion Control Plans	9/13/2011
2.10.3	Erosion Control Maintenance	9/13/2011
SECTION 3.	STREETS	
3.1	Street Design Standards	
3.1.1	Horizontal and Vertical Alignments	
3.1.2	Sidewalks, Curbs and Gutters	
3.1.3	Driveway Approaches	
3.1.4	Pavement Section	
3.1.5	Lighting	
3.1.6	Bus Parking Bay	
3.1.7	Bike Lane	
3.2	Streets Material Standards	
3.2.1	Portland Cement Concrete	
3.2.2	Paint	

INDEX OF REVISIONS

DATE REV

3.2.3	Pavement Markers
3.2.4	Thermoplastic Material
3.2.5	Asphalts
3.2.6	Liquid Asphalts
3.2.7	Asphaltic Emulsions
3.2.8	Corrugated Metal Pipe Casing
3.2.9	Steel or Concrete Pipe Casing
3.2.10	Timber Piling
3.3	Street Construction Standards
3.3.1	Existing Facilities
3.3.2	Clearing and Grubbing
3.3.3	Watering
3.3.4	Dust Palliative
3.3.5	Earthwork
3.3.6	Adjustment of Manhole Frame
3.3.7	Subgrade Preparation
3.3.8	Finishing Roadway
3.3.9	Aggregate Sub-Bases
3.3.10	Aggregate Base
3.3.11	Cement Treated Bases
3.3.12	Penetration Treatment
3.3.13	Bituminous Seals
3.3.14	Road Mixed Asphaltic Surfacing
3.3.15	Asphaltic Concrete
3.3.16	Full Depth Asphalt Concrete
3.3.17	Portland Cement Concrete Pavement
3.3.18	Pavement Sub-Sealing
3.3.19	Piling
3.3.20	Pre-stressed Concrete Members
3.3.21	Concrete Structures
3.3.22	Reinforcement
3.3.23	Air Blown Mortar
3.3.24	Waterproofing
3.3.25	Steel Structures
3.3.26	Sign Structures
3.3.27	Timber Structures
3.3.28	Preservative Treatment
3.3.29	Painting
3.3.30	Reinforced Concrete Pipe
3.3.31	Corrugated Metal Pipe
3.3.32	Structural Plate Pipe, Arches and Pipe Arches
3.3.33	Sub-Surface Drains
3.3.34	Oversize Drains
3.3.35	Miscellaneous Facilities
3.3.36	Sewers
3.3.37	Slope Protection
3.3.38	Curbs, Gutters, Sidewalks, Driveways & Islands
3.3.39	Standard Sign Installation
3.3.40	Fences
3.3.41	Survey Monuments
3.3.42	Markers
3.3.43	Guard Railings
3.3.44	Traffic Stripes & Pavement Markings

INDEX OF REVISIONS

DATE REV

3.3.45	Sandblasting	
3.3.46	Barrier Posts	
3.3.47	Signals & Lighting	
3.3.48	Street Trees	
3.3.49	Street Barricade	
3.3.50	Traffic Control	
SECTION 4. WATER		
4.1	DESIGN STANDARDS	
4.1.1.	Water System Design Standards	9/13/2011
4.1.2	Pumping Plant Design Standards	9/13/2011
4.1.3	Reservoir Design Standards	9/13/2011
4.1.4	Fees	
4.2.	Material Standards	9/13/2011
4.2.1.	Ductile Iron Pipe	9/13/2011
4.2.2.	Polyvinyl Chloride Pipe	9/13/2011
4.2.3	Main Pipeline Fittings	9/13/2011
4.2.4.	Fire Hydrants	9/13/2011
4.2.5	Valves	9/13/2011
4.2.6	Tapping Sleeves and Accessories	9/13/2011
4.2.7	Couplings and Adapters, Mainline	9/13/2011
4.2.8	Service Pipe	9/13/2011
4.2.9	Service Fittings	9/13/2011
4.2.10	Service Saddles	9/13/2011
4.2.11	Valve Boxes	9/13/2011
4.2.12	Water Meter Boxes	9/13/2011
4.2.13	Air Release Valves	9/13/2011
4.2.14	Gaskets and Bolts	9/13/2011
4.2.15	Polyethylene Wrap	9/13/2011
4.2.16	Dielectric Fittings and Coatings for Cathodically Protected Pipelines, Valve Pits, and Pump Stations	9/13/2011
4.2.17	Insulating Flanged Joints	9/13/2011
4.2.18	Tape & Mastic	9/13/2011
4.2.19	Backfill	9/13/2011
4.3	Construction Standards	9/13/2011
4.3.1	General	9/13/2011
4.3.2	Inspection & Submittals	9/13/2011
4.3.3	Existing Facilities	9/13/2011
4.3.4	Trench Excavation	9/13/2011
4.3.5	Bedding and Backfill	9/13/2011
4.3.6	Installation of Water Pipe and Appurtenances	9/13/2011
4.3.7	Filling and Pressure Testing	9/13/2011
4.3.8	Sterilization and Bacteria Testing	9/13/2011
4.3.9	Connections to Existing Mains	9/13/2011
4.3.10	Jacked Steel Casing	9/13/2011
4.3.11	Clean-up	9/13/2011
4.3.12	Incidental Work	9/13/2011
SECTION 5. LANDSCAPING		
5.1	Landscape & Irrigation Design & Construction Standards	7/1/2015
5.1.1	General	7/1/2015

INDEX OF REVISIONS

		DATE REV
5.1.2	Specialists	7/1/2015
5.1.3	Soils Analysis Report	7/1/2015
5.1.4	Landscape & Irrigation Site	7/1/2015
5.1.5	Water Conservation	7/1/2015
5.1.6	Non-Potable Water Use	7/1/2015
5.2	Landscape & Irrigation Materials	7/1/2015
5.2.1	General	7/1/2015
5.2.2	Materials Furnished by the City	7/1/2015
5.2.3	Soil Improvements	7/1/2015
5.2.4	Irrigation Equipment	7/1/2015
5.2.5	Planting Materials	7/1/2015
5.2.6	Hardscape Features	7/1/2015
5.2.7	Pesticides	7/1/2015
5.3	Landscape & Irrigation Construction Standards	7/1/2015
5.3.1	General	7/1/2015
5.3.2	Site Preparation	7/1/2015
5.3.3	Irrigation Systems	7/1/2015
5.3.4	Soil Preparation and Fine Grade	7/1/2015
5.3.5	Planting	7/1/2015
5.4	Landscape Maintenance	7/1/2015
5.4.1	General	7/1/2015
5.4.2	Non-irrigated planting	7/1/2015
SECTION 6	PUBLIC FENCING	
6.1	Fencing Design Standards	7/1/2015
6.1.1	General	7/1/2015
6.1.2	Continuity	7/1/2015
6.1.3	Accessibility	7/1/2015
6.1.4	Durability	7/1/2015
6.1.5	Property Lines and Monuments	7/1/2015
6.1.6	Traffic Protection	7/1/2015
6.1.7	Locks	7/1/2015
SECTION 7.	TRAFFIC SIGNALS	9/13/2011
7.1	General	9/13/2011
7.1.1	Scope of Work	9/13/2011
7.1.2	Plans and Specifications	9/13/2011
7.1.3	Order of Work	9/13/2011
7.1.4	Submittals	9/13/2011
7.1.5	Obstructions	9/13/2011
7.1.6	Maintaining Traffic	9/13/2011
7.1.7	Hours of Work	9/13/2011
7.1.8	As-Built Drawings	9/13/2011
7.2	Cost Breakdown	9/13/2011
7.3	Execution	9/13/2011
7.3.1	Maintaining Existing and Temporary Electrical Systems	9/13/2011
7.3.2	Traffic Control System for Lane Closure	9/13/2011
7.3.3	Standards, Steel Pedestals	9/13/2011
7.3.4	Trenching	9/13/2011
7.3.5	Conduit	9/13/2011
7.3.6	Pull Boxes	9/13/2011

INDEX OF REVISIONS

		DATE REV
7.3.7	Conductors and Wiring	9/13/2011
7.3.8	Signal Interconnect Cable (SIC)	9/13/2011
7.3.9	Service	9/13/2011
7.3.10	Service Equipment	9/13/2011
7.3.11	Model 170 Controller Assembly	9/13/2011
7.3.12	Vehicle Signal Faces and Signal Heads	9/13/2011
7.3.13	Pedestrian Signals	9/13/2011
7.3.14	Detectors	9/13/2011
7.3.15	Alternative Detection for Private Drives	9/13/2011
7.3.16	Pedestrian Push Buttons	9/13/2011
7.3.17	Audible Pedestrian Signals (APS)	9/13/2011
7.3.18	Led Internally Illuminated Street Name	9/13/2011
7.3.19	Light Emitting Diode (LED) Street Lighting and Intersection Safety Lighting	9/13/2011
7.3.20	Emergency Vehicle Pre-Emption System	9/13/2011
7.3.21	In Roadway Warning Lights (IRWL)	9/13/2011
7.3.22	Numbering Electrical Equipment	9/13/2011
7.3.23	Pre-System Turn-On Procedure	9/13/2011
7.3.24	Turn-On Procedure	9/13/2011
7.3.25	Removing, Reinstalling, Salvaging Electrical Equipment	9/13/2011
7.3.26	Measurement/Payment	9/13/2011
Part B.	STANDARD DRAWINGS	
EARTHWORK		
2-01	TERMS USED WITH HILLSIDE HOMES	9/13/2011
2-02	STRUCTURAL FINISH FILL DETAIL	9/13/2011
2-03	TYPICAL TOE OF KEY FILL	9/13/2011
2-04	ROCK DISPOSAL DETAIL-1 OF 2	9/13/2011
2-05	ROCK DISPOSAL DETAIL-2 OF 2	9/13/2011
2-06	IMPORT OR EXPORT TRUCK ROUTE	9/13/2011
2-07	CONCRETE LINED DITCH	9/13/2011
STREETS		
3-01	CITY APPROVAL BLOCKS	9/13/2011
3-02	STREET IMPROVEMENT CROSS-SECTION	9/13/2011
3-03	CUL-DE-SAC AND HALF CUL-DE-SAC DETAILS	9/13/2011
3-04	NORMAL INDUSTRIAL STREETS SERVING ABUTTING PROPERTY	9/13/2011
3-05	ALLEY PAVEMENT CROSS-SECTION	9/13/2011
3-06	STREET BARRICADE	9/13/2011
3-07	APRON AND JOINT DETAILS	9/13/2011
3-08	CURB, GUTTER, AND SIDEWALK DOWELING DETAIL	9/13/2011
3-09	EXPANSION AND OTHER JOINT DETAILS	9/13/2011
3-10	CURB, GUTTER, AND SIDEWALK	9/13/2011
3-11	VALLEY GUTTER	9/13/2011
3-12	RESIDENTIAL DRIVEWAY WITH SEPERATED SIDEWALK AND PLANTER	9/13/2011
3-13	RESIDENTIAL DRIVEWAY RETROFIT – TYPE 1 (ADJOINING VERTICAL CURB AND GUTTER)	9/13/2011 9/13/2011
3-14	RESIDENTIAL DRIVEWAY RETROFIT – TYPE 2	9/13/2011

INDEX OF REVISIONS

		DATE REV
	(ADJOINING VERTICAL CURB AND GUTTER)	9/13/2011
3-15	COMMERCIAL DRIVEWAY	9/13/2011
3-16	COMMERCIAL DRIVEWAY RETROFIT	9/13/2011
3-17	MONOLITHIC CURB WALL	9/13/2011
3-18	MEDIAN CURB	9/13/2011
3-19	SIDEWALK CROSS DRAIN	9/13/2011
3-20	TO RAISE A WATER VALVE, MANHOLE, OR STREET MONUMENT	9/13/2011
3-21	CURB RAMP NOTES REFERENCE - TITLE 24	9/13/2011
3-22	TYPE 1 CURB RAMP DETAIL	9/13/2011
3-23	TYPE 2 CURB RAMP DETAIL	9/13/2011
3-24	TYPE 4 CURB RAMP DETAIL	9/13/2011
3-25	TYPE 5 CURB RAMP DETAIL	9/13/2011
3-26	TYPE 11 CURB RAMP DETAIL	9/13/2011
3-27	MODIFIED TYPE 2 CURB RAMP DETAIL	9/13/2011
3-28	BUS PARKING BAY	9/13/2011
3-29	TYPICAL TRENCH BACKFILL STANDARD DETAIL	9/13/2011
3-30	PCC ALLEY WING CROSSING	9/13/2011
3-31	MONUMENT CASTINGS	9/13/2011
3-32	ALTERNATE CAST IRON MONUMENT CASTINGS	9/13/2011
3-33	INSTALLATION DETAILS, CITY SURVEY MONUMENT AND BENCH MARK	9/13/2011
 WATER		
4-01	FIRE SPRINKLER SERVICE BACKFLOW PREVENTER INSTALLATION (FOR DOUBLE-DETECTOR CHECK VALVE ASSEMBLY WITH VALVES IN-LINE)	9/13/2011
4-02	3/4" & 1" WATER METER INSTALLATION	9/13/2011
4-03	3/4" & 1" WATER SERVICE INSTALLATION	9/13/2011
4-04	1-1/2" & 2" WATER SERVICE INSTALLATION	9/13/2011
4-05	FIRE HYDRANT INSTALLATION WATER DISTRIBUTION SYSTEM	9/13/2011
4-06	THRUST BLOCK & ANCHOR BLOCK DETAILS FOR 4", 6", 8" & 12" FTTINGS	9/13/2011
4-07	REVERSE ANCHOR AND TEMPORARY BLOW OFF	9/13/2011
4-08	2" DIA. BLOW OFF ASSEMBLY	9/13/2011
4-09	6" DIA. BLOW OFF ASSEMBLY (UNIMPROVED AREAS)	9/13/2011
4-10	6" DIA. BLOW OFF ASSEMBLY (IMPROVED AREAS)	9/13/2011
4-11	CHECK VALVE ASSEMBLY	9/13/2011
4-12	ZONE VALVE ASSEMBLY	9/13/2011
4-13	1" & 2" AIR RELIEF VALVE (COMBINATION AIR/VACUUM AND AIR RELEASE VALVE)	9/13/2011
4-14	VALVE ASSEMBLY & TRACKER WIRE INSTALLATION	9/13/2011
4-14a	VALVE ASSEMBLY WATER VALVE BOX	9/13/2011
4-15	MANHOLE FRAME & COVER, 24"	9/13/2011
4-16	6" PRESURE REDUCING STATION	9/13/2011
4-17	3" COMPOUND METER INSTALLATION WITH 2" BYPASS	9/13/2011
4-18	4" COMPOUND METER INSTALLATION WITH 2" BYPASS	9/13/2011
4-19	6" COMPOUND METER INSTALLATION WITH 2" BYPASS	9/13/2011
4-20	2" BYPASS FOR INSTALLATION WITH 3", 4", & 6" COMPOUND METERS	9/13/2011
4-21	BACKFLOW PREVENTER FOR INSTALLATION WITH 3", 4", & 6" COMPOUND METERS	9/13/2011

INDEX OF REVISIONS

DATE REV

LANDSCAPE

5-01	IRRIGATION LINE TRENCHING DETAILS	7/1/2015
5-02	IRRIGATION CONTROLLER MOUNTING DETAIL	7/1/2015
5-03	SATELLITE ASSEMBLY WITH METER DETAIL	7/1/2015
5-04	SATELLITE ASSEMBLY WITHOUT METER DETAIL	7/1/2015
5-05	MASTER VALVE DETAIL	7/1/2015
5-06	3" OR SMALLER ISOATION/GATE VALVE DETAIL	7/1/2015
5-07	REMOTE CONTROL VALVE ASSEMBLY	7/1/2015
5-08	VALVE ASSEMBLY FOR DRIP SYSTEM	7/1/2015
5-09	QUICK COUPLER DETAIL	7/1/2015
5-10	POP UP SPRAY AND SWING JOINT DETAIL	7/1/2015
5-11	ROTOR DETAIL	7/1/2015
5-12	DEEP ROOT TREE BUBBLER DETAIL	7/1/2015
5-13	DRIP BUBBLER DETAIL	7/1/2015
5-14	FLUSH VALVE DETAIL	7/1/2015
5-15	SLEEVING DETAIL	7/1/2015
5-16	VALVE WIRE SPLICE DETAIL	7/1/2015
5-17	IRRIGATION VALVE BOX INSTALLATION DETAIL	7/1/2015
5-18	DRIP EMITTER DETAIL	7/1/2015
5-19	DRIP BUBBLER DETAIL FOR LOW FLOW SYSTEM	7/1/2015
5-20	RADIO - HIGH GAIN ANTENNA	7/1/2015
5-21	MASTER VALVE AND FLOW CONTROL DETAIL	7/1/2015
5-26	15 GALLON TREE PLANTING DETAIL	7/1/2015
5-27	24" BOX OR LARGET TREE PLANTING DETAIL	7/1/2015
5-28	SLOPE TREE PLANTING DETAIL	7/1/2015
5-29	TREE GUYING DETAIL	7/1/2015
5-30	SHRUB PLANTING DETAIL	7/1/2015
5-31	SLOPE SHRUB PLANTING DETAIL	7/1/2015
5-32	MEDIAN AND GORE TREE PLANTING DETAIL	7/1/2015
5-33	MEDIAN GORE SHRUB PLANTING DETAIL	7/1/2015
5-34	GROUND COVER PLANTING DETAIL	7/1/2015
5-35	ROOT BARRIER DETAIL	7/1/2015
5-36	HEADERBOARD DETAIL	7/1/2015
5-37	BOULDER INSTALLATION DETAIL	7/1/2015
5-38	COBBLE DETAIL	7/1/2015

PUBLIC FENCING

6-01	PUBLIC FENCE DETAILS	7/1/2015
6-02	WOOD AND WIRE FENCE DETAIL	7/1/2015
6-03	OPEN RAIL FENCE DETAIL	7/1/2015
6-04	WIRE FENCE WITH 4 x 4 POST DETAIL	7/1/2015
6-05	WIRE FENCE WITH 4 x 6 POST DETAIL	7/1/2015
6-06	TYPE 1 PIPE BARRIER GATE	7/1/2015
6-07	TYPE 2 PIPE BARRIER GATE	7/1/2015
6-08	PIPE BARRIER GATES LATCH/LOCK AND PIVOT POST DETAILS	7/1/2015
6-09	PIPE BARRIER GATE LIST OF MATERIALS	7/1/2015
6-10	PUBLIC FENCE DETAIL #2	7/1/2015

INDEX OF REVISIONS

		DATE REV
TRAFFIC SIGNALS		
7-01	STREET LIGHT POLE	9/13/2011
7-02	LIGHT POLE NUMBER	9/13/2011
7-03	STREET LIGHT LUMINAIRE	9/13/2011
7-04	CHART FOR ESTIMATE OF TRAFFIC INDEX USING A HOUSE COUNT	9/13/2011
7-05	CONVERSION CHART - AVERAGE DAILY TRAFFIC TO TRAFFIC INDEX	9/13/2011
7-06	TRAFFIC SIGN LOCATIONS	9/13/2011
7-07	TRAFFIC SIGN INSTALLATION-1 OF 3	9/13/2011
7-08	TRAFFIC SIGN INSTALLATION-2 OF 3	9/13/2011
7-09	TRAFFIC SIGN INSTALLATION-03 OF 3	9/13/2011
7-10	TYPICAL STREET NAME SIGN SPECIFICATIONS	9/13/2011
7-11	STREET SIGN BRACKETS 90 DEGREE SEPARATOR	9/13/2011
7-12	STREET SIGN BRACKETS POST CAP, SIGN HOLE DETAIL	9/13/2011
7-13	TYPICAL BIKE LANE CROSS-SECTIONS AND LANE MARKINGS	9/13/2011
7-14	AC PAVEMENT KEY CUTTING DETAIL	9/13/2011
7-15	SPEED HUMP & PAVEMENT UNDULATIONS	9/13/2011
7-16	CITY STANDARD BIKE PATH	9/13/2011
7-17	ILLUMINATION # 1	9/13/2011
7-18	ILLUMINATION # 2	9/13/2011
7-19	CIRCULAR LOOP INSTALLATION	9/13/2011
7-20	CROSWALK STANDARDS	9/13/2011
7-21	I.I.S.N.S. STANDARD	9/13/2011

TABLE OF CONTENTS

<u>PART A</u>	<u>STANDARD SPECIFICATIONS</u>	<u>PAGE</u>	
Part A	STANDARD SPECIFICATIONS.....	1	
SECTION 1.			
1.1	General Provisions.....	1	
1.1.1	Purpose.....	1	
1.1.2	Definition of Terms.....	1	
1.1.3	Application.....	1	
1.1.4	Control of Work.....	2	
1.1.5	Control of Materials.....	2	
1.1.6	Legal Relations and Responsibility.....	2	
1.1.7	Construction Plans.....	3	
1.1.8	Hours of Work.....	4	
1.1.9	As-Built Drawings.....	5	
1.1.10	Warranty Bond.....	5	
1.1.11	Pre-construction Meeting.....	5	
1.2	Special Procedures for City Funded and/or Administrator Projects.....	5	
1.2.1	Proposal Requirements and Conditions.....	5	
1.2.2	Award and Execution of Contract.....	6	
1.2.3	Payment.....	11	
1.2.4	Scope of Work.....	11	
1.2.5	Prosecution and Progress.....	12	
SECTION 2. EARTHWORK.....			14
2.1	General.....	14	
2.1.1	Regulatory.....	14	
2.1.2	Definitions.....	14	
2.2	Permits Required.....	17	
2.2.1	Grading Permits.....	17	
2.2.2	Purpose and Intent.....	17	
2.2.3	Grading Permit, Drainage Alteration.....	17	
2.2.4	Excavation blasting permit.....	18	
2.2.5	Types of Grading Permits.....	18	
2.2.6	Discharge of Storm Water Associated with Construction Activity.....	18	

2.3	Grading Permit Requirements.....	18
2.3.1	Permits required.....	18
2.3.2	Application.....	18
2.3.3	Grading Permit Application.....	18
2.3.4	Grading Plan Clearances.....	19
2.3.5	Grading Plan.....	19
2.3.6	Interim Grading Permit.....	19
2.3.7	Land Grading Permit.....	20
2.3.8	Grading Plan Correction.....	21
2.4	Soil and Engineering Geology Report Content.....	21
2.4.1	Investigative Soil Report.....	21
2.4.2	Investigative Engineering Geology Report.....	21
2.4.3	Seismicity and Liquefaction Reports.....	22
2.4.4	Monthly Progress Soils Report.....	22
2.5	Permit Issuance.....	22
2.5.1	Time of Grading Operations.....	22
2.5.2	Responsibility of Permittee.....	23
2.5.3	Protection of Adjoining Property.....	23
2.5.4	Import and export of earth material.....	23
2.5.5	Topsoil.....	24
2.5.6	Spoils.....	24
2.5.7	Dust Control.....	25
2.5.8	Permit Expiration.....	25
2.6	Completion and Acceptance of Work.....	25
2.6.1	Final Reports.....	25
2.6.2	Notification of Completion.....	25
2.6.3	Final Reports.....	25
2.7	Grading Inspection.....	26
2.7.1	General.....	26
2.7.2	Grading Requirements.....	26
2.7.3	Notification of Noncompliance.....	28
2.7.4	Transfer of Responsibility for Approval.....	28
2.8	Site Inspections by Department.....	28
2.8.1	Pregrade Meeting.....	28
2.8.2	Notification.....	28

2.8.3	Excavation and Fill Inspection	29
2.8.4	Concrete V-Ditch	29
2.8.5	Other Drainage Devices	29
2.8.6	Retaining Walls.....	30
2.8.7	Rough Grade Inspection	30
2.8.8	Final Inspection	30
2.8.9	Siltation Control Facilities (Rainy Season: October 15 to April 15)	30
2.9	Embankment Standards.....	31
2.9.1	Cut Slopes.....	31
2.9.2	Fill Location	31
2.9.3	Compaction.....	32
2.9.4	Slope.....	33
2.9.5	Terrace	33
2.9.6	Subsurface Drainage.....	34
2.9.7	Disposal of Surface and Subsurface Drainage	34
2.9.8	Interceptor Ditch.....	35
2.9.9	Retaining Walls.....	35
2.10	Erosion Control	35
2.10.1	Erosion Control System.....	35
2.10.2	Erosion Control Plans	37
2.10.3	Erosion Control Maintenance.....	37
SECTION 3. STREETS.....		39
3.1	Street Design Standards.....	39
3.1.1	Horizontal and Vertical Alignments	39
3.1.2	Sidewalks, Curbs and Gutters	40
3.1.3	Driveway Approaches.....	41
3.1.4	Pavement Section	41
3.1.5	Lighting	42
3.1.6	Bus Parking Bay.....	43
3.1.7	Bike Lane	43
3.2	Streets Material Standards	43
3.2.1	Portland Cement Concrete	43
3.2.2	Paint	43
3.2.3	Pavement Markers.....	44
3.2.4	Thermoplastic Material	44
3.2.5	Asphalts	44
3.2.6	Liquid Asphalts	44

3.2.7 Asphaltic Emulsions	44
3.2.8 Corrugated Metal Pipe Casing	44
3.2.9 Steel or Concrete Pipe Casing	44
3.2.10 Timber Piling.....	44
3.3 Street Construction Standards	44
3.3.1 Existing Facilities	44
3.3.2 Clearing and Grubbing	45
3.3.3 Watering.....	45
3.3.4 Dust Palliative.....	45
3.3.5 Earthwork.....	45
3.3.6 Adjustment of Manhole Frame	51
3.3.7 Subgrade Preparation.....	52
3.3.8 Finishing Roadway.....	52
3.3.9 Aggregate Sub-Bases	52
3.3.10 Aggregate Base	52
3.3.11 Cement Treated Bases.....	52
3.3.12 Penetration Treatment	52
3.3.13 Bituminous Seals	53
3.3.14 Road Mixed Asphaltic Surfacing.....	53
3.3.15 Asphaltic Concrete.....	53
3.3.16 Full Depth Asphalt Concrete	54
3.3.17 Portland Cement Concrete Pavement	54
3.3.18 Pavement Sub-Sealin	55
3.3.19 Piling	55
3.3.20 Pre-stressed Concrete Members	55
3.3.21 Concrete Structures.....	55
3.3.22 Reinforcement	55
3.3.23 Air Blown Mortar	55
3.3.24 Waterproofing.....	55
3.3.25 Steel Structures.....	55
3.3.26 Sign Structures.....	55
3.3.27 Timber Structures	55
3.3.28 Preservative Treatment.....	56
3.3.29 Painting	56
3.3.30 Reinforced Concrete Pipe.....	56
3.3.31 Corrugated Metal Pipe	56
3.3.32 Structural Plate Pipe, Arches and Pipe Arches	56
3.3.33 Sub-Surface Drains	56
3.3.34 Oversize Drains	56
3.3.35 Miscellaneous Facilities	56
3.3.36 Sewers.....	56
3.3.37 Slope Protection.....	56
3.3.38 Curbs, Gutters, Sidewalks, Driveways & Islands	56
3.3.39 Standard Sign Installation	59

3.3.40	Fences	60
3.3.41	Survey Monuments	60
3.3.42	Markers	62
3.3.43	Guard Railings.....	62
3.3.44	Traffic Stripes & Pavement Markings	62
3.3.45	Sandblasting.....	62
3.3.46	Barrier Posts.....	62
3.3.47	Signals & Lighting.....	62
3.3.48	Street Trees.....	66
3.3.49	Street Barricade.....	69
3.3.50	Traffic Control.....	69
 SECTION 4. WATER.....		70
4.1	Design Standards	70
4.1.1	Water System Design Guidelines.....	70
4.1.2	Calculations	71
4.1.3	Plans.....	71
4.1.4	Fees	73
4.2	Material Standards	73
4.2.1	Ductile Iron Pipe (DIP).....	73
4.2.2	Polyvinyl Chloride Pipe (PVC)	74
4.2.3	Main Pipeline Fittings.....	75
4.2.4	Fire Hydrants	75
4.2.5	Valves	75
4.2.6	Tapping Sleeves and Accessories.....	77
4.2.7	Couplings and Adapters, Mainline.....	77
4.2.8	Service Pipe	78
4.2.9	Service Fittings.....	78
4.2.10	Service Saddles	80
4.2.11	Valve Boxes	80
4.2.12	Water Meter Boxes	80
4.2.13	Air Release Valves.....	80
4.2.14	Gaskets and Bolts	81
4.2.15	Polyethylene Wrap	81
4.2.16	Dielectric Fittings and Coatings for Cathodically Protected Pipelines, Valve Pits and Pump Stations	81
4.2.17	Insulating Flanged Joints	82
4.2.18	Tape and Mastic.....	82
4.2.19	Backfill.....	82
4.3	Construction Standards.....	83

4.3.1	General	83
4.3.2	Inspection and Submittals	85
4.3.3	Existing Facilities	86
4.3.4	Trench Excavation.....	87
4.3.5	Bedding and Backfill	92
4.3.6	Installation of Water Pipe and Appurtenances	93
4.3.7	Filling and Pressure Testing.....	99
4.3.8	Sterilization and Bacteria Testing	101
4.3.9	Connections to Existing Mains	102
4.3.10	Jacked Steel Casing.....	104
4.3.11	Clean-Up.....	105
4.3.12	Incidental Work.....	106
SECTION 5. LANDSCAPING		109
5.1	Landscape & Irrigation Design & Construction Standards	109
5.1.1	General.....	109
5.1.2	Specialists	109
5.1.3	Soils Analysis Report	110
5.1.4	Landscape & Irrigation Site	110
5.1.5	Water Conservation	111
5.1.6	Non-Potable Water Use.....	111
5.2.	Landscape & Irrigation Materials	111
5.2.1	General.....	111
5.2.2	Materials Furnished by the City	112
5.2.3	Soil Improvements	112
5.2.4	Irrigation Equipment	113
5.2.5	Planting Materials.....	117
5.2.6	Hardscape Features	118
5.2.7	Pesticides	118
5.3	Landscape & Irrigation Construction Standards.....	118
5.3.1	General.....	119
5.3.2	Site Preparation.....	120
5.3.3	Irrigation Systems	121
5.3.4	Soil Preparation and Fine Grade.....	123
5.3.5	Planting	124
5.4	Landscape Maintenance.....	126
5.4.1	General.....	126
5.4.2	Non-irrigated planting.....	126

SECTION 6 PUBLIC FENCING	128
6.1 Fencing Design Standards	128
6.1.1 General	128
6.1.2 Continuity.....	128
6.1.3 Accessibility	128
6.1.4 Durability.....	128
6.1.5 Property Lines and Monuments.....	129
6.1.6 Traffic Protection.....	129
6.1.7 Locks.....	129
SECTION 7. TRAFFIC SIGNALS.....	130
7.1 General	130
7.2 Cost Breakdown	135
7.3 Execution	136
PART B STANDARD DRAWINGS (CONSTRUCTION DETAILS).....	168

This page intentionally left blank

Part A STANDARD SPECIFICATIONS

SECTION 1.

1.1 General Provisions

1.1.1 Purpose - The purpose of these specifications is to provide certain minimum standards for the design, methods of construction, and use of materials for streets, alleys, concrete structures, traffic signals, water distribution systems, and landscaping after constructed, altered, or repaired within the City of Vallejo; and to provide minimum standards for surveys, preparation of maps, preparation of improvement plans, and monumenting in connection with the aforesaid improvements within the City of Vallejo. These specifications are minimum standards based on sound accepted engineering practices, but are subject to revision as the "state of the art" may mandate for particular cases or practices in general.

1.1.2 Definition of Terms

- A. Standard Specifications: The Standard Specifications of the State of California, Business and Transportation Agency Department of Transportation, current issue. Any reference therein to a State Agency or officer shall be interpreted as the corresponding city office or officer acting under this contract, with address at City Hall, Vallejo, California. In the case of subdivisions, the person or persons, firm, partnership, corporation, or combination thereof, who have entered into an agreement with the City, shall conform to the requirements stipulated for the "Contractor" in the Standard Specifications.
- B. Vallejo Sanitation and Flood Control District Specifications: The Standard Specifications of the Vallejo Sanitation and Flood Control District, current issue, and any subsequently modified specifications of the District. Any permitted deviation from these specifications must be acknowledged in writing by said District and the City.
- C. City: The City of Vallejo.
- D. City Council: The governing body of the City.
- E. Engineer: The City Engineer or his authorized agent who shall represent the City.
- F. Laboratory: The laboratory of the City of Vallejo to the extent of its capability; otherwise as defined in the Standard Specifications, or hereunder noted in these specifications.

1.1.3 Application These specifications shall apply to, and the City Engineer is hereby authorized to make inspection and to enforce the provisions of these specifications

within all the incorporated territory of the City of Vallejo. Any reference to quantities and/or payment refer to projects which are funded by the City of Vallejo.

1.1.4 Control of Work: Attention is directed to the provisions of Section 5 of the Standard Specifications for the requirements concerning the control of the work.

1.1.5 Control of Materials: Attention is directed to the provisions of Section 6 of the Standard Specifications for the requirements and conditions for control of materials.

All laboratory tests required under these specifications will be performed by the City of Vallejo or by a qualified Soils Engineer employed by the contractor who shall be under direct supervision of a Registered Soils Engineer. Charges for Soils Engineer will be paid by the contractor or subdivider.

1.1.6 Legal Relations and Responsibility

- A. General: Attention is directed to the provisions of Section 7 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning legal relations and responsibility.
- B. Laws to be Observed: In connection with the laws to be observed and responsibility of the Contractor, attention is directed to Section 7 of the Standard Specifications and the laws therein referred to, all of which are applicable to this contract.
- C. Public Convenience and Safety: The Contractor shall furnish, install, and maintain traffic warning and directional signs at the work site as required by the latest Traffic Manual of the California Department of Transportation or as directed by the Engineer.

The Contractor shall designate in writing the name, address, and telephone number of the employee to contact after working hours for the proper maintenance of barriers and signs. Attention is directed to Section 5-1.06 of the Standard Specifications which provides that the Contractor shall similarly designate in writing the Superintendent of the Work.

- D. Damage to Private Property: Any damage to private property caused by the Contractor and adjudged to be the responsibility of the Contractor by the Engineer shall be rectified to the satisfaction of the Engineer within a reasonable time, depending on the extent of the damage. Said reasonable time shall be as determined by the Engineer, and if the condition is not rectified, the Engineer shall have the power and authority to rectify said damage and the cost thereof to be paid for by the Contractor, either by direct payment to the City of Vallejo, or by deducting said amount from monies due the Contractor.

1.1.7 Construction Plans

A. General

Complete plans and specifications for all proposed improvements, grading, landscaping, irrigation, and fencing, including any necessary dedications and easements, shall be submitted to the Department of Public Works for review and must receive the required approval prior to the beginning of construction of any such grading or improvements. Such plans shall be prepared by or certified by a Registered Civil Engineer in accordance with the provisions of "Civil Engineer's Act" Chapter 7 - Division 3 of the Business and Professions Code, relating to the practice of Civil Engineering.

B. Preparation: Construction plans and specifications shall be prepared in accordance with the following requirements, unless otherwise approved by the City Engineer.

1. Dimensions - Construction plans shall be clearly and legibly drawn in ink on engineering tracing paper 24 by 36 inches with a 1-1/2 inch clear margin on the left edge and 1 inch margins on all other edges.
2. Scale - Horizontal scale shall be 1" = 40'; vertical scale shall be 1" = 4' or as approved.
3. Title Sheet
 - a. Name of Subdivision or Project
 - b. Vicinity Map with North Arrow
 - c. Index of sheets
 - d. Signature blocks
4. Second Sheet
 - a. Plan view showing the entire street right of way layout (Scale 1" = 100'), proposed water and sewer mains, storm drainage system, lot numbers, and other miscellaneous improvements to be installed.
 - b. Complete legend.
 - c. Typical Street Section.
 - d. Title Block - located in lower edge or right edge of paper. See Drawing No. 3-1.

- e. Temporary and permanent bench marks including their descriptions.
- f. Provision for future benchmarks in subdivision.
- g. General and special notes relating to construction methods.

5. Street Plan and Profile

- a. Plan view of each street to be improved shall be shown on separate sheets indicating existing improvements, proposed improvements and future improvements if known. Proposed improvements shall include sidewalk, curb, gutter, driveways, sewer mains, water mains, water service and sewer lateral locations, storm drains, manholes, valves, survey stationing, signing, striping, street lights, and other data as required by the City Engineer. The survey stationing shall normally read from left to right with the north arrow pointing either to the top or left edge of the sheet. All stationing shall be a continuation of existing improvements where possible.
- b. Profile view of each street shall be shown immediately above its plan view. The profile shall include existing grade lines, sewer mains, storm drains, water mains, public utility mains, all utility crossings, and top of curb. Elevations shall be shown on top of curb at grade break points, manhole and catch basin inverts, and water main crossings with other utilities.

6. Grading Plan

For additional information refer to Section 2.3 -Grading Permit Requirements

After formal approval of the plans by the City Engineer has been received, four copies blue line plus one Mylar (polyester film 3 mill) copy (with matte surface up) shall be filed with the City Engineer's office for City records. Additional copies of reduced improvement plans (11" x 17") may be required by the City Engineer at his discretion and shall be furnished to the City without cost.

1.1.8 Hours of Work

A. Straight Time

Regular working hours are 8:00 a.m. to 4:30 p.m., Monday through Friday, excluding holidays observed by the City. The Contractor shall keep the Engineer fully informed of all work outside these working hours in order to assure proper scheduling of required inspection and materials testing personnel. The costs of

inspection of such work shall be charged to the Contractor. All inspection work and vehicle usage outside the regular working hours as described above or beyond 8 hours per day on any particular job, shall be charged at each inspector's current overtime rate with applicable overhead.

B. Night & Weekend Work

If at any time, the Engineer deems it necessary for proper progress of the work or to avoid unacceptable interruption of customer service, the Contractor may be required to prosecute the work at night or on weekends. In addition, if the Contractor requests to do work at night or on weekends, he may be allowed to do so if approved by the Engineer. The Contractor shall bear all costs for inspection of night and weekend work. No such work shall be done unless previously approved in writing by the Engineer.

1.1.9 As-Built Drawings - Provide and keep up to date a complete set of record prints, which shall be corrected regularly, showing every change from the original Contract set of Drawings, including all Addendum, Change Orders, Job Decisions, etc. Upon completion of the work, two sets of prints and one set of 3 MIL mylars shall be delivered to the City and all changes as noted on the record set of prints shall be incorporated thereon. All changes shall be neatly and legibly drawn to scale on the set of prints using standard architectural or engineering drafting practices. As-built drawings shall be signed on each sheet by the Civil Engineer and City Inspector, see DW No. 3-1 for City Inspector's signature block.

1.1.10 Warranty Bond - As a condition precedent to the acceptance of any project, the Contractor or Developer shall furnish a bond of a surety company authorized to do business in the State of California acceptable to the City in an amount ten percent (10%) of the total contract price to be held by the City for a period of one year after the completion and acceptance of the work, to protect the City against the results of defective materials, work quality and equipment during that time. This bond shall be delivered to the City before acceptance of the project by the City.

1.1.11 Pre-construction Meeting - Pre-construction meetings shall be held for citizens affected by sensitive construction projects. Pre-construction notification in lieu of meeting shall be acceptable if deemed appropriate by the City Engineer.

1.2 Special Procedures for City Funded and/or Administrator Projects

1.2.1 Proposal Requirements and Conditions

A. General: The bidder's attention is directed to the provisions of Section 2 of the Standard Specifications as supplemented herein, for the requirements and conditions which he must observe in the preparation of the proposal form and the submission of the bid.

- B. Proposal Form: The proposal form is bound in the Special Specifications which may be obtained from the Office of the City Engineer, City Hall, Vallejo, California, as advertised in the "Notice to Contractors."
- C. Disqualification of Bidders: In addition to the other requirements the bidder must declare in the proposal that he has not accepted any bid from any subcontractor or vendor through any bid depository, the bylaws, rules or regulations of which prohibit or prevent the contractor from considering any bid from any subcontractor or vendor, which is not processed through said bid depository, or which prevent any subcontractor or vendor from bidding to any contractor who does not use the facilities of or accept bids from or through such bid depository.
- D. Competency of Bidders: Upon demand bidders shall submit evidence to the City as to their ability, financial responsibility and experience in order to be eligible for consideration of their proposal.

1.2.2 Award and Execution of Contract

- A. General: The bidder's attention is directed to the provisions of Section 3 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning award and execution of the contract.
- B. Contract Bonds - The successful bidder shall furnish with the contract a FAITHFUL PERFORMANCE BOND in the amount of 100% of the total bid and a PAYMENT (LABOR AND MATERIALS) BOND, in the amount of 100% of the total bid, on the forms prescribed by the City.
- C. Responsibility of Contractor, Hold Harmless & Indemnity Agreement

The contractor shall take all responsibility for the work and shall defend, indemnify, release and hold harmless the City, its officers, officials, directors, employees, agents and volunteers, from all claims, loss, damage, injury, and liability of every kind, nature, and description, directly or indirectly arising from the performance of the contract of work regardless of responsibility for negligence (including costs and expenses, which include attorney's fees, incurred in connection therewith) and from any and all claims, loss, damage, injury, and liability, howsoever the same may be caused, resulting directly or indirectly from the nature of the work covered by the contract, regard-less of responsibility for negligence (including costs and expenses, which include attorney's fees, incurred in connection therewith), but excluding liability due to the sole negligence or willful misconduct of the City.

The Engineer of Work, pursuant to this contract and indemnity agreement, may, at the time of preparing and certifying the final voucher, an as a condition of preparing and certifying the same, require the Contractor to continue his bond or any part thereof, as security against any such unsatisfied claims, for a time not

exceeding the time when such claims would be legally barred. Approval of the insurance contracts required does not relieve the Contractor or sub-contractors from liability under this hold harmless and responsibility clause.

D. Responsibility for Damage and Insurance Requirements for Contractor

BIDDERS' ATTENTION IS DIRECTED TO THE INSURANCE REQUIREMENTS BELOW. IT IS HIGHLY RECOMMENDED THAT BIDDERS CONFER WITH THEIR RESPECTIVE INSURANCE CARRIERS OR BROKERS TO DETERMINE IN ADVANCE OF BID SUBMISSION THE AVAILABILITY OF INSURANCE CERTIFICATES AND ENDORSEMENTS AS PRESCRIBED AND PROVIDED HEREIN. IF AN APPARENT LOW BIDDER FAILS TO COMPLY STRICTLY WITH THE INSURANCE REQUIREMENTS, THAT BIDDER MAY BE DISQUALIFIED FROM AWARD OF THE CONTRACT.

The Contractor shall assume all responsibility for damage to property or injuries to persons caused by any equipment of any kind furnished by him under the contract or the operation thereof.

The Contractor shall procure and maintain for the duration of the contract insurance against claims for in-juries to persons or damages to property which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees or subcontractors. Such insurance shall not be construed to relieve the Contractor of any liability in excess of such coverages. The cost of such insurance shall be included in the Contractor's bid.

1. Minimum Scope of Insurance

Coverage shall be at least as broad as:

- a. Insurance Services Office form number GL 0002 (Ed. 1/73) covering Comprehensive General Liability and Insurance Services Office form number GL 0404 covering Broad Form Comprehensive General Liability; or Insurance Services Office Commercial General Liability coverage ("occurrence" form CG 0001).
- b. Insurance Services Office form number CA 0001 (Ed. 1/78) covering Automobile Liability, code 1 "any auto" and endorsement CA 0025.
- c. Workers' Compensation insurance as required by the Labor Code of the State of California and Employers Liability insurance.

2. Minimum Limits of Insurance

Contractor shall maintain limits no less than:

- a. General Liability: \$1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit.
- b. Automobile Liability: \$1,000,000 combined single limit per accident for bodily injury and property damage.
- c. Workers' Compensation and Employers Liability: Workers' compensation limits as required by the Labor Code of the State of California and Employers Liability limits of \$1,000,000 per accident.

3. Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the City, its officers, officials, employees and volunteers; or the Contractor shall procure a bond guaranteeing payment of losses and related investigations, claim administration and defense expenses.

4. Other Insurance Provisions

The policies are to contain, or be endorsed to contain the following provisions:

- a. General Liability and Automobile Liability Coverages
 - 1. The City, its officers, officials, employees and volunteers are to be covered as insureds as respects: liability arising out of activities performed by or on behalf of the Contractor, including the insured's general supervision of the Contractor; products and completed operations of the Contractor, premises owned, occupied or used by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the City, its officers, officials, employees or volunteers.
 - 2. The Contractor's insurance coverage shall be primary insurance as respects the City, its officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by the City, its officers, officials, employees or volunteers shall be excess of the Contractor's insurance and shall not contribute with it.
 - 3. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the City, its officers, officials, employees or volunteers.
 - 4. The Contractor's coverage 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.

b. Workers' Compensation and Employers Liability Coverage

The insurer shall agree to waive all rights of subrogation against the City, its officers, officials, employees and volunteers for losses arising from work performed by the Contractor for the City.

c. All Coverages

Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the City.

5. Acceptability of Insurers

Insurance is to be placed with insurers with a Best's rating of no less than A: VII.

6. Verification of Coverage

Contractor shall furnish the City with certificates of insurances and with original endorsements effecting coverage required by this section. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. The certificates and endorsements are to be on forms provided by the City. Where by statute, the City's workers' compensation-related forms cannot be used, equivalent forms approved by the Insurance Commissioner are to be substituted. All certificates and endorsements are to be received and approved by the City before work commences. The City reserves the right to require complete, certified copies of all required insurance policies, at any time.

7. Subcontractors

Contractor shall include all subcontractors as insureds under its policies or shall furnish separate certificates and endorsements for each subcontractor. All coverages for subcontractors shall be subject to all of the requirements stated herein.

8. Sample forms for General Liability Endorsement, Automobile Liability Endorsement, Workers' Compensation/Employers Liability Endorsement and Certificate of Insurance are shown in Appendix A. The most current forms and coverage requirement may be obtained from the Office of the Director of Public Works.

E. Builder's Risk Insurance - The Contractor shall effect and maintain in the name of

the Contractor and the City, "All Risk" builders Risk Insurance upon the entire work of this contract to 100% of replacement cost valuation thereof, including items of labor and materials in place including surplus miscellaneous materials and supplies incident to the work, and such scaffoldings, staging, towers, forms, and equipment as are not owned or rented by the contractor, the cost of which is not included in the cost of the work.

- F. Exclusions - This insurance does not cover tools owned by mechanics, any tools, equipment, scaffoldings, staging, towers, and forms rented or owned by the Contractor, the capital value of which is not included in the cost of the work or any shanties or other structures erected for the sole convenience of the workers.
- G. Beginning of Work, Time of Completion and Liquidated Damages - Time is of the essence on this contract. The Contractor shall show evidence that all necessary materials have been ordered within TEN (10) days from the date the Notice to Proceed is issued by the City Engineer.

The Contractor shall begin work within TEN (10) days after the City Engineer has signed the Notice to Proceed, and shall diligently prosecute the same to completion.

It is understood that failure of the Contractor to complete the work within the above stipulated number of days will or may subject the City to serious loss or damage.

Should the Contractor fail to complete the work provided for herein, within the time fixed for such completion, due allowance being made for unavoidable delays, he/she shall become liable to the City in the amount of TWO HUNDRED AND FIFTY DOLLARS (\$250.00) per calendar day (minimum) for each day said work remains incomplete beyond the time for completion, as and for liquidated damages and not as a penalty, agreed upon by the parties to the contract, it being expressly stipulated that it would be impracticable and extremely difficult to fix the actual amount of damage. If it appears to the Contractor that he will not complete the work provided in this contract in the time agreed, he/she shall make written application to the City at least FIVE (5) CALENDAR DAYS PRIOR TO THE EXPIRATION OF THE TIME FOR COMPLETION, stating the reason why and amount of extension which he/she believes should be granted. The City may then, in its discretion, grant or deny such extension.

Any money due, or to become due, the Contractor may be retained to cover the said liquidated damages, and should such money not be sufficient to cover such damages, the City shall have the right to recover the balances from the Contractor, or his/her sureties.

1.2.3 Payment

- A. General - Attention is directed to the provisions of Section 9 of the Standard Specifications, as herein supplemented, for the requirements and conditions concerning measurement and payment for the work.
- B. Claims Against the Contractor - The City may withhold from any estimate due the Contractor, a sum sufficient to protect the City from loss on account of (1) Claims filed or reasonable evidence indicating probable filing of claims; (2) Defective work not remedied; (3) Failure of Contractor to make payments properly to Subcontractors or for material or labor; (4) A reasonable doubt that the contract can be completed for the balance then unpaid; (5) Damage to another Contractor on the project, which amounts withheld will be paid upon removal of grounds for withholding payment; or (6) Any other reason specified in the contract as grounds for withholding such payments.
- C. Force Account Payment - The force account payment shall be made as specified in Section 9-1.03 of the Standard Specifications.
- D. Partial Payments - The City will make monthly progress payments to the Contractor for the value of work done in the previous month, less proper deduction, within 30 (thirty) days after receipt and approval of the invoice.
- E. Final Payments - Upon satisfactory completion of the work and the receipt of the warranty bond and as-built drawings, the Engineer shall recommend the acceptance of the work to the City Council. Upon acceptance of the completed work by the City Council, the said

Council shall cause to be filed and recorded in the office of the County Recorder a NOTICE OF COMPLETION.

Thirty-Five (35) days after the recording of the Notice of Completion, the Contractor shall be entitled to the balance due for the completion and acceptance of the work, provided that all claims for labor and materials have been paid, and that no claims shall have been filed with the City based upon acts of omission of the Contractor and that no liens or stop notices shall have been filed against the work or the property on which the work was done. Attention is directed to Sections 1.1.12 and 1.1.13 of this specification.

- F. Adjustment of Overhead Costs - No adjustment of overhead costs will be made for percentage deviation of the actual final contract amount from the total bid price.

1.2.4 Scope of Work

- A. General: Attention is directed to the provisions of Section 4 of the Standard

Specifications, as supplemented herein, for the requirements and conditions concerning the scope of the work.

- B. Increased or Decreased Quantities: All contract items of work will be paid for at the respective prices listed in the contract for any quantities of such work done and accepted by the City. No adjustment to unit prices will be made for percentage deviation of actual quantities from the Engineer's estimated quantities.

1.2.5 Prosecution and Progress

- A. General: Attention is directed to the provisions of Section 8 of the Standard Specifications, as supplemented herein, for the requirements and conditions concerning the prosecution and progress of the work.
- B. Designation of Subcontractors: In compliance with the provisions of Section 4100 - 4108 inclusive, of the Public Contracts Code of the State of California, and any amendments thereof, each bidder shall set forth in the Proposal Form:
 - 1. The name and location of the place of business of each subcontractor who will perform work or labor or render service to the contractor in or about the construction of the work or improvement in an amount in excess of one-half (1/2) of one percent of the contractor's total bid or ten thousand dollars (\$10,000) whichever is greater.
 - 2. The portion of the work which shall be done by each subcontractor.

If the contractor fails to specify a subcontractor for any portion of the work to be performed under the contract in excess of one-half of one percent of the contractor's total bid, he agrees to perform that portion himself.

The contractor shall not, without the consent of the City, either:

- a. Substitute any person or subcontractor in place of the subcontractor designated in the original bid;
- b. Permit any such subcontractor to be assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the bid;
- c. Sublet or subcontract any portion of the work in excess of one-half of one percent of the contractor's total bid as to which his original bid did not designate a subcontractor.

The City may consent to the substitution of another person as subcontractor when the subcontractor named in the bid, after having had a reasonable

opportunity to so do, fails or refuses to execute a written contract, when said written contract, based upon the general terms, conditions, plans and specifications for the project involved, or the terms of such subcontractor's written bid, is presented to him by the contractor.

Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the contractor's total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, and then only after a finding reduced to writing as a public record of the City Council setting forth the facts constituting the emergency or necessity. If the contractor violates any of the provisions of said Sections 4100-4108 inclusive, of said Public Contracts Code, or any amendments thereof, he violates his contract and the City may cancel the contract. After any such violation, the contractor shall be penalized to the extent of twenty percent (20%) of the amount of the subcontract involved. Funds recovered through the application of this penalty shall be paid to the City of Vallejo.

SECTION 2. EARTHWORK

2.1 General

2.1.1 Regulatory - Earthwork shall conform to the City Regulations, Standard Specifications and general notes, State of California Standard Specifications (Sections 19 & 20), California Building Code (Current Version as adopted by California Building Standard Commission), and the City of Vallejo Flood Damage Protection (No. 1526 N.C. (2d)) and Excavations, Grading and Filling (No. 400 N.C. (2d)) ordinances and as supplemented herein. When the requirements of the above mentioned standards have over-lapping requirements the highest standard shall be held to apply, unless otherwise approved by the City Engineer.

2.1.2 Definitions

Approval shall mean a written engineering or geological opinion by the responsible engineer, geologist of record or responsible principal of the engineering company concerning the progress and completion of the work.

Approved plans shall mean plans prepared and signed by a civil engineer or architect and reviewed and signed by the soils engineer of record, City Planning Division, and Engineer.

Approved testing agency shall mean a facility whose testing operations are controlled and monitored by a registered geotechnical/soils engineer and which is equipped to perform and certify the tests required by this standard and formulate an opinion of the testing performed.

Archaeological Resource for the purposes of CEQA an "important archaeological resource" is one which is associated with an event or person and can provide information which is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable archaeological research questions.

Borrow is earth material acquired from an on or off-site location for use in grading on a site.

Civil engineer shall mean a professional engineer registered in the State of California to practice in the field of civil engineering.

Civil engineering shall mean the application of the knowledge of the forces of nature, principles of mechanics and the properties of materials for the evaluation, design, and construction of civil works for the beneficial uses of mankind.

Architect shall mean licensed architect registered in the State of California to practice in the field of architecture engaging in preparation of plans including site grading and site drainage.

Clearing, brushing, and grubbing shall mean the removal of vegetation (grass, brush, trees, and similar plant types) by mechanical means.

Director shall mean Director of Public Works.

Earth material is any rock, natural soil or fill and/or any combination thereof.

Engineer the City Engineer or his authorized agent who shall represent the City.

Engineering geologist shall mean a geologist registered in the State of California to practice engineering geology.

Engineering geology shall mean the application of geologic knowledge and principles in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works.

Erosion is the wearing away of the ground surface as a result of the movement of wind, water, and/or ice.

Erosion control system is a combination of desilting facilities, and erosion protection, including effective planting, to protect adjacent private property, watercourses, public facilities and receiving waters from an abnormal deposition of sediment or dust. This system must be designed by an authorized Registered Professional Engineer.

Excavation is the mechanical removal of earth material.

Fill is a deposit of earth material placed by mechanical means which shall be tested and result in an acceptable engineered fill.

Grade shall mean the vertical location of the ground surface.

Natural grade is the original ground surface unaltered by artificial means.

Existing grade is the ground surface prior to grading.

Rough grade is the stage at which the grade approximately conforms to the approved plan.

Finish grade is the final grade of the site which conforms to the approved plan.

Grading is any excavation or filling or combination thereof.

Grading contractor is an engineering general contractor licensed and regulated by the State of California who specializes in grading work or is otherwise licensed to do grading work.

Hillside site is a site which entails cut and/or fill grading of three (3) feet or more in vertical height below or above natural ground; or a combination fill-over-cut slope equal to or greater than five (5) feet in vertical height; or where the existing grade is ten (10) percent or greater; and which may be adversely affected by drainage and/or stability conditions within or from outside the site, or which may cause an adverse effect on adjacent property.

Interim grading permit is a permit that is issued on the basis of approved plans which may show a structure location but must show interim building pad drainage to the degree required by the Engineer.

Land grading permit is an official document issued by the Engineer authorizing grading activity as specified by approved plans and specifications.

Owner is any person, agency, firm, or corporation having a legal or equitable interest in a given real property.

References - Unless indicated otherwise, or as reasonably appears from the context, references in this Standard apply to the project civil engineer, the soil engineer, the geologist, and the engineering geologist referring to the professional person(s) preparing, signing, or approving the project plans and specifications which comprise the approved grading plan, and which professional person appears of record or his successor appearing pursuant to Transfer of Responsibility for Approval.

Site is any lot or parcel of land or contiguous combination thereof, under the same ownership or written contractual relationship establishing permission, where grading is performed or permitted.

Slope is an inclined ground surface, the inclination of which is expressed as a ratio of horizontal distance to vertical distance or a percentage thereof.

Soil is naturally occurring surficial deposits overlying bedrock.

Soils engineer shall mean a registered professional engineer who has successfully passed the State professional examination and is authorized to use the "Geotechnical" designation. The titles "Geotechnical Engineer" and "Soils Engineer" are considered synonymous.

Special inspector is an inspector duly licensed and authorized by the Engineer to perform inspection of asphalt concrete placement, retaining walls and related

construction work or other grading related work approved by the Engineer.

Terrace is a relatively level step constructed in the face of a graded slope surface for drainage and maintenance purposes.

Topsoil is the native undisturbed soil cover or imported soil as in Sections 2.5.5 and 5.2.3.1 hereunder which is capable of sustaining healthy plant life.

For additional terminology and grading details see Drawing Nos. 2-1 to 2-7.

2.2 Permits Required

2.2.1 Grading Permits - No person shall conduct any grading, clearing, brushing, or grubbing on natural or existing grade that is preparatory to grading, without first having obtained a grading permit from the Engineer. Exceptions to this requirement are provided in Chapter 12.40.030 of City Municipal Code.

2.2.2 Purpose and Intent

2.2.2.1 It is the intent of this Standard to safeguard life, limb, property, archaeological resource and the public welfare by regulating grading on private property in the areas of the City of Vallejo.

2.2.2.2 This Standard sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments, and establishes administrative requirements for issuance of permits and approval of plans and inspection of grading construction in accordance with the requirements for grading and excavation as contained herein.

2.2.3 Grading Permit, Drainage Alteration - No person shall alter an existing drainage flow, watercourse, channel, or revetment by excavating, or placing fill, rock protection or structural improvements without a valid grading permit by the Engineer and written authorization from the Vallejo Sanitation and Flood Control District and any other agencies having jurisdiction or unless waived by the Engineer and the Vallejo Sanitation and the Vallejo Sanitation and Flood Control District to perform interim protection under emergency flood fighting conditions.

2.2.3.1 Structural Elevation in the Flood Plain - New construction and substantial improvements of any structure within the floodplain shall be in conformance with the City Flood Damage Protection Ordinance and shall have the lowest floor, including basement, elevated to or above one-half foot (6 inches) above the base flood elevation. Manufactured homes shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above one foot (12 inches) higher than the base flood elevation. Base flood elevation or 100 year flood elevation is shown on the

Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency.

2.2.4 Excavation blasting permit - No person shall possess, store, sell, transport or use explosives and blasting agents to do any excavation without a permit from the City Fire Prevention Division.

2.2.5 Types of Grading Permits - Either an Interim grading permit or a Land grading permit may be issued for grading work upon completion of an application in accordance with the regulations of the earth-work standards and approval by the Engineer. The Interim or Land permit is the option of the permittee provided that the plans satisfy the requirements of the earthwork standards, City Planning Division, and the Engineer.

2.2.6 Discharge of Storm Water Associated with Construction Activity - A Notice of Intent (NOI) shall be filed with the State Water Resources Control Board before commencement of any construction activities that will result in disturbance of one acre or greater of total land area.

2.3 Grading Permit Requirements

2.3.1 Permits required - Except as exempted, a separate permit may be required for each project site and may cover both excavations and fills.

2.3.2 Application - To obtain a grading permit, the applicant must file an application in writing on a form furnished by the Engineer. The permit application shall be accompanied by information and documents required for issuance of a permit.

2.3.3 Grading Permit Application - A grading permit application shall consist of, but not be limited to, the following items and forms completed, submitted, and signed by the applicant or his representative for review and approval:

Three sets of grading plans

Two copies of a site specific soil and geology report

Three sets of erosion control plans

Cost estimates, which include but are not limited to earthwork quantities, subdrains, V-ditches, erosion control, etc.

Grading permit fees

Surety bonds, letter of credit, etc.

Any other supporting information or technical data required by the Engineer.

2.3.4 Grading Plan Clearances - Prior to issuance of a grading permit, written clearance will be required from other agencies. Depending on site conditions and location, written clearance or permits may be required from, but not limited to, the following agencies:

Vallejo Sanitation & Flood Control District

California Water Resources Control Board

California Department of Fish and Game

California Coastal Conservation Commission

California Division of Industrial Safety

Army Corps of Engineers

Bay Conservation and Development Commission

Utility companies having easement interest on the site

The applicant shall be responsible for submitting copies of the grading plans and information required by those agencies and obtaining the required clearances or permits. Copies of permit clearances shall be submitted to the Engineer.

2.3.5 Grading Plan - Information on Plans and Specifications: Plans submitted for plan check shall be drawn to scale and shall be of sufficient clarity to indicate the nature and extent of the work proposed and show in detail that they will conform to the provisions of all relevant laws, ordinances, rules and regulations and Section 1.1.9 of this specification.

The first sheet of each set of plans shall give the location of the work and the name and address and telephone number of the owner, the person by whom they were prepared, the project soil engineer, or engineering geologist and when required the project paleontologist and archaeologist.

2.3.6 Interim Grading Permit - The plans shall include but not be limited to the following information:

1. Vicinity map of the site.
2. Property limits clearly labeled or otherwise identified and accurate contours of existing ground and details of terrain and area drainage a

minimum of fifty (50) feet beyond property limits (spot elevations may be used on flatland sites).

3. Prominent existing or natural terrain features.
4. Limiting dimensions including setbacks between property lines and top and toe of slopes, keyways, elevations of finish contours to be achieved by the grading, elevations of top and bottom of proposed retaining walls, proposed drainage and related construction.
5. Details (plan and section) of all surface and subsurface drainage devices, walls, cribbing, dams and other protective devices to be constructed with, or as a part of the proposed work together with a map showing the drainage area and estimated runoff from the area served by any drains.
6. Location of any existing buildings or structures on the property where the work is to be performed and the location of any buildings or structures on land of adjacent owners which are within fifteen (15) feet of the property, or which may be adversely affected by the proposed grading operations.
7. If the grading project includes the movement of earth material to or from the site in an amount considered substantial by the Engineer, the permittee shall submit the haul route for review and approval by the Engineer prior to the issuance of a grading permit. The Engineer may suggest alternate routes or special requirements in consideration of the possible impact on the adjacent community environment or effect on the public right-of-way itself, which the Engineer shall prescribe as a condition of the grading permit. Detail Drawing No. 2-6 illustrates City truck route map.
8. Additional plans, drawings, calculations, environmental impact information, or other reports required by the Engineer.

2.3.7 Land Grading Permit - The plans shall include the following details in addition to the above items listed for Interim Grading Permits:

The footprint or allowable building area of all pro-posed structures (including appurtenances).

Setback distances between structures and top and toe of slopes, including retaining walls.

Detailed finish grade and finish floor elevations.

Flowlines for lot drainage.

Details for building footing and side-yard swale relationship (including extra-height of footing).

All proposed concrete flatwork and/or driveways.

Typical cross-section for building pad when sub-excavation is required.

The Land Grading Plan shall identify all previous Interim grading permits issued for the project site. It may include sheets from the Interim grading plan which show original topography in lieu of reproducing original contours on the precise plan.

2.3.8 Grading Plan Correction - A Grading Plan Correction Sheet (checklist) is available at the Department which identifies additional items typically required on grading plans depending on site conditions.

2.4 Soil and Engineering Geology Report Content

Two copies of each report required in this section shall be submitted as part of the application for grading permit. Each report shall contain all information applicable to the project. Soils and foundation investigations shall be conducted in conformance with California Building Code.

Recommendations contained in the approved reports shall be incorporated into the grading plans and specifications and shall become part of the grading permit.

2.4.1 Investigative Soil Report

2.4.1.1 Soil engineering reports shall be required for all subdivision, commercial/industrial, multi-residential and similar developments involving structures and/or earthwork for which a grading permit is required. Soil reports shall also be required for grading or building permits on single lot projects when specified by the Engineer.

2.4.1.2 The investigative soil engineering report shall include information and data regarding the nature, distribution, and the physical properties of existing soils; conclusions as to adequacy of the site for the proposed grading; recommendations and details for general and corrective grading procedures; foundation and pavement design criteria and shall provide other recommendations, as necessary, to commensurate with the project grading and development.

2.4.2 Investigative Engineering Geology Report

2.4.2.1 Engineering geology reports shall be required for all developments where geologic conditions are considered to have a substantial effect on existing

and/or future site stability. This requirement may be extended to other sites suspected of being adversely affected by faulting.

- 2.4.2.2 The investigative engineering geology report shall include a comprehensive description of the site topography and geology; an opinion as to the adequacy of the proposed development from an engineering geologic standpoint; an opinion as to the extent that instability on adjacent properties may adversely affect the project; a description of the field investigation and findings; conclusions regarding the effect of geologic conditions on the proposed development; and specific recommendations for plan modification, corrective grading and/or special techniques and systems to facilitate a safe and stable development, and shall provide other recommendations as necessary, to commensurate with the project grading and development. The engineering geology report may be combined with the soil engineering report.

2.4.3 Seismicity and Liquefaction Reports

- 2.4.3.1 Seismicity and Liquefaction reports shall be required as a condition for issuance of a grading permit for all subdivisions (tracts); and all sites for critical structures (fire stations, nursing homes, etc.) and major structures as determined by the Engineer. Additionally sites containing earthquake sensitive earth materials and/or sites that are located on or near potentially active or active faults shall also require a seismicity report.
- 2.4.3.2 The report shall be prepared by an engineering geologist, geophysicist, or a civil engineer with knowledge in earthquake technology and its application to buildings and other civil engineering works. The scope of the report shall be commensurate with the proposed development and shall reflect the state of art. The seismic report may be combined with the soil and engineering geology reports.

- 2.4.4 Monthly Progress Soils Report** - The Engineer may require the soils engineer to submit a progress report for grading operations which require more than 25 working days to complete. Any progress reports due shall be submitted to the City within five working days after each 25 days thereafter.

2.5 Permit Issuance

(Refer to the City of Vallejo Municipal Code Chapter 12.40 Excavation, Grading, Filling, Sections 12.40.060 and 12.40.070)

- 2.5.1 Time of Grading Operations** - Grading and equipment operations within 1,000 feet of a structure for human occupancy shall not be conducted between the hours of 6:00 p.m. and 7:00 a.m. nor on Sundays and federal holidays. The Engineer may, however, permit grading or equipment operations during specific hours after 6 p.m. or before 7 a.m. or on Sundays and federal holidays if he determines that such operations are not detrimental to the health, safety, or

welfare of the inhabitants of such a structure. Permitted hours of operating may be shortened by the Engineer's finding of a previously unforeseen effect on the health, safety, or welfare of the surrounding community. However, no permit that has been issued, nor any provision of this section shall be construed to be a waiver of the applicability of the provisions set forth in Codified Ordinances of the City relating to noise control.

2.5.2 Responsibility of Permittee - It shall be the responsibility of the permittee to be knowledgeable of the conditions and/or restrictions of the grading permits outlined in applicable sections of this Standard or City ordinances, and as contained on the approved grading plans and in the approved soil and geology reports. The permittee shall also be responsible to maintain in an obvious and accessible location on the site, a copy of the grading plans bearing the stamp of approval by the Engineer.

2.5.3 Protection of Adjoining Property - Each adjacent owner is entitled to the lateral and subjacent support which his land receives from the adjoining land, subject to the right of the owner of the adjoining land to make proper and usual excavations on the same for purposes of construction or improvement as provided by law, Section 832 of the California Civil Code.

2.5.4 Import and export of earth material - Where an excess of fifty (50) cubic yards of earth per project site is moved on public roadways from or to the site of an earth grading operation, all the following requirements shall apply:

2.5.4.1 Either water or dust palliative or both must be applied for the alleviation or prevention of excessive dust resulting from the loading or transportation of earth from or to the project site on public roadways. The permittee shall be responsible for maintaining public rights-of-way used for handling purposes in a condition free of dust, earth, or debris attributed to the grading operation.

2.5.4.2 Loading and transportation of earth from or to the site must be accomplished within the limitations established by the time of grading operations of this earthwork standard.

2.5.4.3 Access roads to the premises shall be only at points designated on the approved grading plan.

2.5.4.4 The last fifty (50) feet of the access road, as it approaches the intersection with the public roadway, shall have a grade not to exceed three (3) percent and be constructed of Class II roadbase material. There must be three hundred (300) feet clear, unobstructed sight distance to the intersection from both the public roadway and the access road. If the three hundred (300) feet sight distance cannot be obtained, flagmen shall be posted.

- 2.5.4.5 A stop sign conforming to the requirements of the California Department of Transportation Manual of Unified Traffic Control Devices (CAMUTCD) shall be posted at the entrance of the access road to the public roadway.
- 2.5.4.6 An advance warning sign must be posted on the public roadway at a distance conforming to CAMUTCD requirements on either side of the access intersection, carrying the words 'truck crossing.' The sign shall be diamond shape, each side being thirty six(36) inches in length, shall have high intensity sheeting background, and the letters thereon shall be five (5) inches in height. The advance warning sign shall be covered or removed when the access intersection is not in use.
- 2.5.4.7 All traffic signing shall conform to the State of California, Department of Transportation, and Manual of Traffic Control Devices for Construction and Maintenance Work Zones.

2.5.5 Topsoil

- 2.5.5.1 Each finished parcel or lot shall be provided with minimum of 6 inches of fertile friable topsoil of loamy character. Topsoil may be obtained from sources within the project or shall consist of imported topsoil obtained from sources outside the project or from both sources. Topsoil obtained from sources within the project shall be excavated to the depths as directed by the Soils Engineer. All lumps or clods shall be broken up before the topsoil is spread. Topsoil obtained from within the project will be considered as selected material within the meaning of the State Standard. Topsoil shall be stockpiled in accordance with Section 7-706.2 of the "Highway Design Manual" of the California Department of Transportation. Construct stock piles to freely drain and not to impound surface water.
- 2.5.5.2 Imported topsoil shall consist of material obtained from sources outside the limits of the project. Unless designated in the special provisions, the Contractor shall make his own arrangements for obtaining imported topsoil and he shall pay all costs involved.
- 2.5.5.3 Imported topsoil shall consist of fertile, friable soil of loamy character, and shall contain an amount of organic matter normal to the region. It shall be obtained from well-drained arable land and shall be reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than 3/4 inch in size, noxious seeds, sticks, brush, litter, toxic substances and other deleterious substances. Imported topsoil shall be capable of sustaining healthy plant life and approved as such by a testing laboratory and shall comply with Section 5.2.3.1 of this specification.

- 2.5.6 Spoils** - Spoils are to be defined as excessive material removed in making excavations, etc. All grading, site preparation, placing and compacting of spoils

fill after the completion of mass grading shall be done under the direct supervision of the soils engineer. Subsequent to completion of work, the soils engineer shall submit to the City of Vallejo Public Works Department, a report stating that all fills consisting primarily of spoils has been done to his satisfaction. Recommendations of the soils report shall be strictly adhered to unless otherwise approved by the City Engineer.

2.5.7 Dust Control - All earthmoving operations within the City shall be subject to control of airborne nuisance. Dust control operation, if ordered by the Engineer, shall be done as provided in Section 10 of the Standard Specifications and shall be paid for by the contractor.

2.5.8 Permit Expiration - Chapter 12.40.120 states: "If the work authorized by any permit under this chapter is not commenced within nine months of the date of issuance, or as otherwise indicated on the face of the permit, or if the work is not complete within two years of the date of issuance, or sooner, as indicated on the face of the permit, the permit shall expire and become null and void.

2.6 Completion and Acceptance of Work

2.6.1 Final Reports - General - Rough grade and final soil and engineering geology reports shall be submitted in accordance with City of Vallejo Municipal Code Chapter 12.40.130 - Acceptance of Work.

2.6.2 Notification of Completion - The permittee or his agent shall notify the Engineer when the grading operation is ready for final inspection. All work including installation of all drainage facilities and their protective devices and all erosion control measures must be completed in accordance with the final approved grading plan and the required reports approved by the City. He may approve the grading work prior to completion of all work in special cases of extreme hardship and if no hazard exists and an adequate bond is posted to assure completion of all remaining work.

2.6.3 Final Reports - Upon completion of the mass grading work and at the final completion of the earthwork under the grading permit but prior to building any structure or release of grading bonds or issuance of a certificate of use and occupancy, the Engineer may require:

2.6.3.1 An as-graded plan prepared by a civil engineer or an architect which shall include corrected original ground surface elevations if necessary, graded ground surface elevations, lot drainage pat-terns, graded slope inclination, keyways, and location of all drainage facilities and subdrains.

2.6.3.2 A written opinion by the soils engineer of record describing the grading as being completed in conformance with the soils report in accordance with the approved grading plan.

2.6.3.3 A written approval by the project civil engineer stating the grading as being substantially in conformance with the grading plan and which specifically provides the following items as appropriate to the project and stage of grading:

Construction of line and grade for all engineered drainage devices and retaining walls.

Staking of property corners for proper building location and elevation.

Setting of all monuments in accordance with the recorded tract map.

Location of permanent walls or structures on property corners of property lines where monumentation is not required.

Location and inclination of all graded slopes.

Construction of earthen berms and positive building pad drainage.

2.7 Grading Inspection

2.7.1 General - All grading operations for which a permit is required shall be subject to inspection by the Engineer or designated Special Inspector.

2.7.2 Grading Requirements

2.7.2.1 It shall be the responsibility of the project civil engineer who prepares the grading plan approved by the Engineer to incorporate all recommendations from the soil and geological engineering reports into the grading plan. This responsibility shall include, but need not be limited to, the establishment of line, grade, drainage, and archaeological resources within the development area. The general grading contractor shall act as the coordinating agent in the event the need arises for liaison between the Engineer and the project civil engineer or soils engineer. Included shall also be responsibility for preparation of revised plans requiring approval from the Engineer, erosion control plans, and submission of as-graded plans upon completion of the work.

2.7.2.2 Soil engineering and engineering geology reports shall be required as specified. During grading, all necessary progress and final reports, compaction data, soil engineering and engineering geology supplemental recommendations shall be generated by the soil engineer and engineering geologist. The permit holder (permittee) shall submit copies of the report to the civil engineer and two copies of all reports to the Engineer.

- 2.7.2.3 Prior to the preparing of any grading plans and specifications, the project Engineer shall inspect the site to determine that the plans and specifications are current and reflect existing conditions.
- 2.7.2.4 If the City finds the soil or other conditions not as stated in the approved plans and soil or geology reports or as in additional information which was required for issuance of the grading permit, he may, using reasonable judgment, refuse to allow further work until approval is obtained for a revised grading plan which will conform to the existing site conditions.
- 2.7.2.5 The provisions of Stop Orders, Chapter 12.40.150 of Vallejo Municipal Code, Violations - Creation of a dangerous or hazardous condition - criminal penalties shall apply to all grading work and whenever the Engineer determines that any work does not comply with the terms of a permit, or this Standard, or that the soil or other conditions are not as stated on the permit, he may order the work stopped by notice in writing served on any persons engaged in doing or causing of such work to be done and any such persons shall forthwith stop such work until authorized by the Engineer to proceed with the work.
- 2.7.2.6 Prior to the building of any structure on a graded site, the rough grading shall be completed to the satisfaction of the responsible civil engineer, engineering geologist, soil engineer, and the Engineer.
- 2.7.2.7 Whenever any work on which inspections are required is covered or concealed by additional work without first having been inspected, the Engineer may require by written notice, that such work be exposed for examination. The work of exposing and recovering shall not entail or be subject to expense by the City.
- 2.7.2.8 The Engineer may establish special inspection requirements in accordance with Section 1704, Special Inspections, of the California Building Code, as amended for special cases involving grading or paving related operations. Special cases may apply to work where in the opinion of the Engineer it is necessary to supplement the resources or expertise available for inspection.
- 2.7.2.9 The soil engineer's area of responsibility shall include, but need not be limited to, the professional observation and approval concerning the preparation of ground to receive fills, testing for required compaction, stability of all finish slopes, design of buttress fills, subdrain installation and in-corporation of data supplied by the engineering geologist.
- 2.7.2.10 The engineering geologist's area of responsibility shall include, but need not be limited to, professional inspection and written approval of the adequacy of natural ground for receiving fills, the stability of cut slopes with respect to geological matters, and the need for subdrains or other ground water

drainage devices. He shall report his finding to the soil engineer for engineering analysis.

2.7.2.11 The City may expeditiously inspect the project at the various stages of work requiring approval and at any more frequent intervals necessary to determine that adequate control is being exercised by the professional consultants.

2.7.3 Notification of Noncompliance - If in the course of fulfilling their responsibility under this Standard, the project civil engineer, the soil engineer, the engineering geologist, the grading contractor or the testing agency finds that the work is not being done in conformance with the provisions of the approved specifications and grading plans, the discrepancies shall be reported immediately in writing to the person in charge of the grading work and the Engineer.

2.7.4 Transfer of Responsibility for Approval - If the project civil engineer, the soil engineer, the engineering geologist, the testing agency, or the grading contractor of record are changed during the course of the work, the work shall be stopped unless: (1) the permit holder (permittee) submits a letter of notification verifying the change of the responsible professional; and (2) the new responsible professional submits in writing that he has reviewed all prior reports and/or plans (specified by date and title) and work performed by the prior responsible professional and that he concurs with the findings, conclusions, and recommendations, and is satisfied with the work performed. He may modify or revise recommendations, specifications or work performed if accompanied by supporting data and approved by the Engineer. He must state that he assumes all responsibility within his purview on a specified date. All exceptions must be justified to the satisfaction of the Engineer.

Exception: Where clearly indicated that the firm, not the individual engineer and/or geologist, is the contracting party, the designated engineer or geologist may be reassigned and another engineer and/or geologist within the firm may assume responsibility.

2.8 Site Inspections by Department

2.8.1 Pregrade Meeting - Prior to any grading, brushing or clearing, there shall be a pregrade meeting held on the site. The permittee, or his agent, shall notify the Engineer at least two (2) working days prior to the meetings and shall be responsible for notifying all principals responsible for grading or related operations.

2.8.2 Notification - It shall be the duty of the superintendent doing the work authorized by a permit to notify the Engineer at least twenty-four (24) hours prior to the work being completed for the following inspections.

2.8.3 Excavation and Fill Inspection

- 2.8.3.1 Canyon Cleanout: After all brush and unsuitable material has been removed and an acceptable base has been exposed, but before any fill is placed.
- 2.8.3.2 Keyway or Toe Bench: After the natural ground or bed-rock is exposed and prepared to receive fill, but before fill is placed.
- 2.8.3.3 Over-Excavation: After the area has been excavated but before fill is placed.
- 2.8.3.4 Excavation: After the excavation is started, but before the vertical depth of the excavation exceeds ten (10) feet, and every ten (10) foot interval thereafter.
- 2.8.3.5 Fill: After the fill has started, but before the vertical height of the fill exceed ten (10) feet, and every ten (10) feet interval thereafter.
- 2.8.3.6 Slide repair: Before slide removal begins during any additional headscarp or down slope soil movement and finally the complete slide removed as observed with the certified engineering geologist.

2.8.4 Concrete V-Ditch

- 2.8.4.1 Staking and Subgrade: Prior to placement of welded wire mesh or reinforcing steel.
- 2.8.4.2 Reinforcement: Thickness control wire and reinforcing steel or welded wire mesh are to be installed but prior to placement concrete.
- 2.8.4.3 Concrete Placement.

2.8.5 Other Drainage Devices

- 2.8.5.1 Subdrains:
 - 2.8.5.1.1 After excavation but prior to placement of filter material and pipe. The subdrain pipe and filter material shall be on-site for inspection.
 - 2.8.5.1.2 After filter material and subdrain has been placed but prior to covering with backfill.
 - 2.8.5.1.3 The contractor shall flush and test subdrain lines in the presence of the soils engineer.
 - 2.8.5.1.4 Must be as built surveyed before placement of engineered fill.

2.8.5.2 Earth Swales:

2.8.5.2.5 Prior to rough grading approval or lumber drop.

2.8.5.2.6 Prior to final grading approval.

2.8.6 Retaining Walls - Public right-of-way or public open space:

2.8.6.3 Review of offset staking for location and observation of footing bottoms.

2.8.6.4 Upon completion of footings with reinforcement and forms, prior to placement of concrete.

2.8.6.5 After removal of forms and substantial completion of fine grade.

2.8.6.6 Prior to backfill of subdrains and permeable filter material on-site.

2.8.6.7 Private retaining walls shall not be vertically excavated for until the Building Permit has been obtained; see 2.9.9 Retaining Walls.

2.8.7 Rough Grade Inspection – When all rough grading has been completed. This inspection may be called for at the completion of rough grading without the necessity of the City having previously reviewed and approved the required final reports if the grading was performed under a grading permit. All subdrains and slope drains shall be in place and approved as a condition for rough grading inspection.

2.8.8 Final Inspection - After all work, including installation of all drainage structures and other protective devices (see Section 2.6.2), has been completed and all written professional approvals and the required final reports have been submitted. An As-Graded Plan will be required when the finished site deviates from the approved grading plan.

2.8.9 Siltation Control Facilities (Rainy Season: October 15 to April 15)

- A. After excavation of desilting basins but prior to fill placement. Prefabricated devices are to be available on-site for inspection.
- B. After fill placement for desilting basins but prior to placement of concrete or other non-erosive materials.
- C. After completion of an erosion control system in accordance with an approved erosion control plan and the requirements of the Engineer.

2.9 Embankment Standards

2.9.1 Cut Slopes - Cut slopes shall be no steeper than two horizontal to one vertical (2:1). In special circumstances where no evidence of previous instability exists and when recommended in the soil engineering or engineering geology report and approved by the Engineer, slopes may be constructed steeper than 2:1. In no case shall slopes steeper than 2:1 be approved if 2:1 or flatter slopes are required as a condition of approval of any project by the Planning Commission, Planning Director, Public Works Director or City Council without appropriate revision of said condition by the approving body.

Recommendations in the soil engineering and/or engineering geology report for cut slopes to be steeper than 2:1 shall be accompanied by a slope stability analysis for all slopes greater than three (3) feet in height. The soil engineer shall consider both gross and surficial stability of the slope and provide a written opinion approving the slope stability.

2.9.2 Fill Location - Fill slopes shall not be constructed on natural slopes steeper than two (2) horizontal to one (1) vertical (2:1) or where the fill slope daylighted out within twelve (12) feet horizontally of the top of existing or planned cut slopes, outside the permit area boundary, unless designed by the soils engineer and approved by the Engineer.

2.9.2.1 Preparation of Ground - The ground surface shall be prepared to receive fill by removing vegetation; noncomplying fill; topsoil and other unsuitable materials; and by scarifying to provide a bond with the new fill. Where existing slopes exceed five (5) feet in height and/or are steeper than five horizontal to one vertical (i.e., 5:1), the ground shall be prepared by benching horizontally into sound bedrock or other competent material, as determined by the soil engineer and/or engineering geologist and approved by the Engineer. The lowermost bench (key) beneath the toe of a fill slope shall be a minimum ten (10) feet in width or as approved by the soils engineer. The ground surface below the toe of fill shall be prepared for sheet flow runoff, or a paved drain shall be provided.

Where not specified in the approved plans and fill is to be placed over a cut slope, the bench (key) under the toe of the fill shall be at least fifteen (15) feet wide, the cut slope must be made before placing fill and shall meet the approval of the soil engineer and/or engineering geologist as suitable foundation for fill.

Unsuitable soil is soil which is not dense, firm or unyielding, is highly fractured or has a high organic content and in the opinion of the Engineer, civil engineer, soil engineer, or engineering geologist is not competent to support other soil or fill, to support structures or to satisfactorily perform the other functions for which the soil is intended.

2.9.2.2 Fill Material

- 2.9.2.2.1 Detrimental amounts of organic material shall not be permitted in fills. Except as outlined below, no rock or similar irreducible material with a maximum dimension greater than twelve (12) inches shall be buried or placed in fills without the consent of the soils engineer.
- 2.9.2.2.2 The Engineer may permit placement of larger rock when the soil engineer properly devises a method of placement, continuously inspects placement, and approves the fill stability and competency. The following conditions shall also apply:
 - 2.9.2.2.2.1 Prior to issuance of the grading permit, potential rock disposal area(s) shall be delineated on the grading plan.
 - 2.9.2.2.2.2 Rock sizes greater than twelve (12) inches in maximum dimension shall be fifteen (15) feet or more below grade, measured vertically. This depth may be reduced upon recommendation of the soil engineer and approval of the Engineer providing that the permitted use of the property will not be impaired.
 - 2.9.2.2.2.3 Rocks greater than twelve (12) inches shall be placed so as to be completely surrounded by soils; no nesting or rocks will be permitted (see Detail Drawing No. 2-5).

2.9.3 Compaction - All engineered fills shall be compacted to a minimum relative compaction of the maximum by density as determined by ASTM D-1557-78 of ninety (90) percent. The geotechnical engineer may recommend greater compaction should geotechnical conditions warrant such specifications. Nuclear gauge testing methods shall conform to ASTM D-2922-81 (Density of Soil & Soil Aggregate, by Nuclear Methods) and ASTM D-3017-78 (Moisture Content of Soil & Soil Aggregate in Place by Nuclear Methods). Field in-place density shall be determined by the above standard or equivalent to the Uniform Building Code Standard No. 70-1 or 70-2.

2.9.3.1 Locations of field density tests shall be determined by the soil engineer and shall be sufficient in both horizontal and vertical placement to provide representative testing of all fill placed. Testing in areas of a critical nature or special emphasis shall be in addition to the normal representative samplings.

2.9.3.2 Exceptions:

2.9.3.2.1 Fills where the Engineer determines that compaction is not a necessary safety measure to aid in preventing saturation, settlement, slipping, or erosion.

- 2.9.3.2.2 Where lower density and very high potential expansion characteristics as defined by Table No. 29-C of the Uniform Building Code exist, lesser compaction may be granted by the Engineer upon justification and recommendation by the soil engineer.
- 2.9.3.3 Fill slopes shall be compacted to the finish slope face as specified above. The soil engineer shall provide specifications for the method of placement and compaction of the soil within the zone of the slope face (see Standard Drawing No. 2-2).
- 2.9.3.4 Sufficient maximum density determinations by test method shall be performed during the grading operations to verify that the maximum density curves used are representative of the material placed throughout the fill.
- 2.9.4 Slope** - Fill slopes shall be no steeper than two horizontal to one vertical (2:1). In special circumstances where no evidence of previous instability exists and when recommended in the soil engineering report and approved by the Engineer, slopes may be constructed steeper than 2:1. In no case shall slopes steeper than 2:1 be graded if 2:1 or flatter slopes are required as a condition of approval of any project by the Planning Commission, Planning Director, Public Works Director or City Council without appropriate revision of said condition by the approving body.
- 2.9.4.1 Recommendations in the soil engineering report for fill slopes to be steeper than 2:1 shall be accompanied by a slope stability analysis of all slopes greater than five (5) feet in height. The soil engineer shall consider both the gross and surficial stability of the slope and provide a written statement approving the slope stability. In addition, the soil engineer shall recommend alternative methods of construction or compaction requirements necessary for surficial stability.
- 2.9.5 Terrace** - Terraces at least six (6) feet in width shall be established at not more than thirty (30) foot vertical intervals on all cut or fill slopes to control surface drainage and debris, except that where only one (1) terrace is required, it shall be at mid-height. All terrace widths and spacing for cut and fill slopes shall be designed by the project civil engineer in accordance with recommendations of Soils Engineer and approved by the Engineer. Suitable access shall be provided to permit proper cleaning and maintenance.

Concrete ditches on terraces shall have a minimum gradient of two (2) percent and must be paved with reinforced concrete, or approved equal, not less than four (4) inches in thickness (see Standard Drawing No. 2-7 for details and type of ditch).

A single run ditch shall not collect runoff from a tributary area exceeding 15,000 square feet (projected) without discharging into a down drain.

2.9.6 Subsurface Drainage - Cut and fill slopes shall be provided with approved subsurface drainage as necessary for stability and protection of adjacent properties from the influence of ground water. The design of such facilities shall be contained in the approved preliminary (initial) soil engineering or engineering geology report and shall appear on the approved grading plan pursuant to the recommendation of the soil engineer and/or the engineering geologist. Subsurface drainage shall be designed to be such that no maintenance is required to keep them functioning properly.

Subsurface drainage facilities shall be installed where natural and/or artificially introduced ground water affects or is likely to affect the project in a potentially unstable, hazardous or otherwise deleterious manner.

2.9.7 Disposal of Surface and Subsurface Drainage - All drainage facilities shall be designed to carry waters to the nearest practicable drainage way approved by the Engineer and appropriate jurisdiction as a safe place to deposit such water. Drainage capacity shall comply with the Vallejo Sanitation and Flood Control design criteria for area drained and a connection permit would be required by the Vallejo Sanitation and Flood Control District. Erosion of ground in the area of discharge shall be prevented by installation of non-erosive down drains, rip rap, energy dissipaters or other approved devices including a return of flow to a natural sheet flow condition.

2.9.7.1 Where surface waters are to be conducted or directed onto adjacent property in an unnatural manner, the Engineer and VSFCD shall require the applicant, prior to issuance of a grading permit, to obtain written permission from the owner of said property, accepting the surface waters.

2.9.7.2 Building sites shall have a sheet flow drainage gradient minimum of two (2) percent from the structure toward approved swales and/or drainage facilities, unless otherwise approved by the Engineer. The maximum drainage gradient of an earth swale shall be 2 percent and should have cross section and gradient sufficient to carry a fifteen (15) year storm.

2.9.7.3 Grading of future building sites under an interim grading permit for the purpose of lot sales shall have a sheet flow drainage gradient of two (2) percent toward approved drainage facilities. The Engineer may reduce this minimum gradient to one and one half (1 1/2) percent upon the written request of the applicant or his agent, providing the applicant demonstrates the following:

2.9.7.3.1 Finish grades for drainage of building sites can be constructed in accordance with the requirements of this subsection without importing additional fill, and

2.9.7.3.2 Sufficient approved swales and/or drainage facilities are constructed to

prevent water from ponding on any lot supported by a natural slope or cut or fill slope over five (5) feet in height.

2.9.7.4 Finish grades, other than above, shall conform to the following minimum drainage gradient standards:

	Minimum Gradient
A. Earth Swales	1.5%
B. Earth (sheet flow)	1.5%
C. Concrete Lined Ditch	2.0%

2.9.8 Interceptor Ditch - Concrete (interceptor) ditch shall be installed along the top of all slopes where the tributary drainage area has a drainage path to top of slope greater than forty (40) feet measured horizontally. Interceptor drains shall be paved with a minimum of four (4) inches of reinforced concrete. They shall have a minimum depth of eighteen (18) inches and a paved minimum width of forty eight (48) inches measured horizontally across the drain. Ditches shall have hydraulic capacity with four (4) inch freeboard sufficient to convey fifteen (15) year flows as determined by VSFC tables and graphs. The slope of the drain shall be approved by the Engineer. (See Detail Drawing No. 2-7.

2.9.9 Retaining Walls - Retaining walls shall be designed to resist the lateral pressure of the retained material and structures in accordance with accepted engineering principles. All walls within a public right-of-way or public open space shall be of reinforced masonry or concrete construction (unless otherwise approved by the Engineer) and if exceeding six (6) feet in vertical height may be subject to provisions of 2.7.1 General -...Special Inspector. All other walls are private and are under the review and required inspections of the Building Division.

2.10 Erosion Control

2.10.1 Erosion Control System

2.10.1.1 The faces of cut and fill slopes and project site shall be prepared and maintained to control against erosion in accordance with the most current issue of Manual of Standards for Erosion and Sediment Control Measures, Association of Bay Area Governments (ABAG).

2.10.1.2 Where necessary, temporary and permanent erosion control devices such as desilting basins, check dams, rip rap or other devices or methods, as approved by the Engineer, shall be employed to control erosion and provide safety during the rainy season from October 1st to April 15th.

- 2.10.1.3 No grading work in excess of fifty (50) cubic yards will be allowed between October 1st and April 15th on any single grading site under permit unless an erosion control system has been approved by the Engineer.
- 2.10.1.4 Paved streets, sidewalks, or other improvements shall be maintained in a neat and clean condition free of loose soil, construction debris and trash. Street sweeping or other equally effective means shall be used on a regular basis to prevent storm flows from carrying sediment and debris outside the project boundaries. Watering shall not be used to clean streets except for fine material not otherwise removed by sweeping or other mechanical means.
- 2.10.1.5 The permittee is responsible to retain a civil engineer or an authorized individual for inspection and modification of the devices, as necessary during the rainy season.
- 2.10.1.6 Desilting facilities shall be provided at drainage out-lets from the graded site.
- 2.10.1.7 Desilting basins shall be designed to provide a minimum desilting capacity equal to the current Manual of Standards (ABAG). Acceptable visual maximum silt level indicators shall be provided in each basin.
- 2.10.1.8 Desilting basins shall be constructed around the perimeter of projects whenever feasible when it provides improved maintenance access from paved roads during wet weather.
- 2.10.1.9 Desilting basins constructed of compacted earth shall be compacted to a relative compaction of ninety (90) percent of maximum density as determined by ASTM 1557 test methods. A soil engineering report, prepared by the soil engineer, which includes the type of field testing performed, location and results of testing, shall be submitted to the City for approval upon completion of the desilting basins.
- 2.10.1.10 Equipment and workers for emergency work shall be made available at all times during the rainy season. Necessary materials shall be available on-site and stock-piled at convenient locations to facilitate rapid construction of temporary devices when rain is imminent.
- 2.10.1.11 Erosion protection shall consist of effective planting or hydro seeding of all slopes in excess of five (5) feet high unless otherwise approved by the City.
- 2.10.1.12 Protection for the slopes shall be installed as soon as practicable which may be prior to rough grade acceptance and October 1st. Effective planting or hydro seeding shall be installed, fully germinated and effectively cover the required slopes prior to final approval unless otherwise approved by the City.

- 2.10.1.13 The erosion control provisions shall take into account drainage patterns during the current and future phases of grading throughout the rainy season.
- 2.10.1.14 All removable protective devices shown shall be in place at the end of each working day when the five (5) day rain probability forecast exceed forty (40) percent.
- 2.10.1.15 Graded areas around the tract perimeter must drain away from the face of slopes at the conclusion of each working day.

2.10.2 Erosion Control Plans

- 2.10.2.1 Erosion control plans prepared with this Standard shall be submitted to the Engineer with project grading plan for approval by September 15 each year for projects under grading permit. The erosion control plan may be waived for grading projects on single residential lot projects providing that an erosion control system, meeting the approval of the City, has been installed, placed, planted or constructed before October 1st.

2.10.3 Erosion Control Maintenance

- 2.10.3.1 After each rainstorm, silt and debris shall be removed from check berms and desilting basins and the basins pumped dry.
- 2.10.3.2 After each rainstorm, the performance of the erosion control system shall be evaluated and revised and re-paired as necessary.
- 2.10.3.3 Excessive silt and construction debris shall not be permitted to be conveyed from the site with storm drainage flows.
- 2.10.3.4 Devices shall not be moved or modified without the approval of the City.
- 2.10.3.5 The contractor shall be responsible and shall take necessary precautions to prevent public trespass onto areas where impounded water creates a hazardous condition.
- 2.10.3.6 The contractor, permittee and project owner shall be responsible for continual maintenance of the devices during the rainy season. In the event of failure or refusal by the contractor, permittee or project owner to properly maintain the devices, the Engineer may cause emergency maintenance work to be done to protect adjacent private and public property. The cost shall be charged to the owner and shall include an initial mobilization cost plus the cost of doing the work.
- 2.10.3.7 In the event the Engineer must cause emergency maintenance work to be done, he may revoke the grading permit in writing. The permit shall not be

renewed until an erosion control system approved by the Engineer is installed.

- 2.10.3.8 If any grading has commenced on private property with-out a valid grading permit, the property owner may be required to prepare and implement an erosion control plan which has been approved by the Engineer. In the event of failure by the property owner to install an approved erosion control system, the Engineer may cause emergency work to be done to protect adjacent private and public property (See "E" above)

SECTION 3. STREETS

3.1 Street Design Standards

- A. General - The design of streets shall conform to the following standards, standard detail drawings and to any Master Plan of Streets and Highways approved by the City Council:
- (a) A minimum six (6) foot wide public utility and planting easement shall be provided on each side of the street right-of-way.
 - (b) Any deviation from the standards outlined in the above table must be approved by the City Engineer.
 - (c) Hillside street standards may be used in the design of streets only when such streets are to be constructed in an area of previously undeveloped land having natural grades in excess of ten (10) percent and the same area meets all the criteria for designation as hillside land as provided in the City of Vallejo Hillside Development Guidelines. In the design of hillside streets, accepted engineering practices relating to roadway geometrics and safe sight distance must be strictly adhered to.
 - (d) Cul-de-Sac streets should not exceed 500 feet in length.
 - (e) Street name shall be approved by the Public Works Director.

3.1.1 Horizontal and Vertical Alignments

- A. For the purpose of geometric design of streets, the following minimum design speeds shall be used:

<u>Type of Facility</u>	<u>Design Speed (MPH)</u>
Arterials	45 mph
Collectors	40 mph
Residential and Cul-de-Sac	30 mph
Hillside Street	25 mph

- B. Streets shall intersect as near to ninety degrees as practicable. Offset or staggered intersections shall be avoided. Spacing of intersections closer than 200 feet shall be avoided.
- C. Horizontal curves shall have a minimum centerline radius as follows:

(1) Arterial	700 feet
(2) Collectors	550 feet

- (3) Residential, Cul-de-Sac 300 feet
- (4) Hillside Street 100 feet

Smaller radii may be used only when specifically approved by the City Engineer.

- D. Broken-back horizontal curves consisting of two curves in the same direction jointed by a short tangent shall be avoided.
- E. All temporary dead-end streets shall have turnarounds unless approved otherwise by the City Engineer. If the elevation of the dead-end street does not correspond with the elevation of the adjoining property, a level bench of four (4) feet and a slope of cut or fill shall be provided outside the dead-end street right-of-way and a slope easement provided to the City of Vallejo.
- F. All street grades shown on improvement plans shall refer to the City of Vallejo datum. (Zero elevation of City of Vallejo datum is equal 6.34 feet of USCGS Elevation.)
- G. Minimum grade rate for all streets shall be 0.5 percent, unless otherwise approved by the Engineer.
- H. Vertical curves shall be used to connect grade profiles where the algebraic difference in grade rates exceed one (1) percent.
- I. The length of vertical curve shall be adequate to assure safe stopping sight distance and shall be based on vehicular speed and the algebraic difference in grade rates in accordance with State Highway Design Manual.
- J. The cross slope on all tangent street sections shall be two (2) percent. The cross slope on horizontal curve sections shall be determined based on the vehicular speed, the degree of curvature, and the side friction factor using the computation methods endorsed by the Institute of Traffic Engineers. Any deviation from these conditions must be approved by the City Engineer.
- H. In design of streets superelevation shall be considered in accordance with State Highway Design Manual.
- I. In design of streets consideration shall be given to street drainage such that street gutter shall be capable of carrying a 15-year storm flow without flooding the travel lane. (Refer to Vallejo Sanitation & Flood Control District Guide to Existing Policies & Engineering Design Standards.)

3.1.2 Sidewalks, Curbs and Gutters

- A. The width of sidewalks shall conform to Section 3.1 of these specifications.

- B. Sidewalks, curbs and gutters shall be designed as shown on the Standard Details, Drawing 3-10.
- C. Handicapped ramps shall be provided at all curb returns, Standard Detail Drawing 3-17.
- D. Construction of sidewalks, curbs and gutters shall conform to Section 3.3.37 of these Specifications.
- E. Sidewalk cross drains shall conform to Standard Drawings Nos. 3-14 and 3-15.

3.1.3 Driveway Approaches

- A. No driveway shall be constructed any closer than five (5) feet measured at the top of the curb at the weakened plane joint from any property line on residential or commercial properties. Refer to Drawing No. 3-11.
- B. No driveway shall be constructed closer than 15 feet from the curb return if the parcel is adjacent to an intersection.
- C. In commercial districts, no more than 60 percent of the frontage of any parcel shall be devoted to driveways and no one driveway shall be wider than 36 feet.
- D. The spacing between driveways shall not be less than twenty (20) feet measured at the top of curb unless otherwise approved by the City Engineer.
- E. Driveway grades shall be in accordance with Ordinance No. 1018 N.C.(2d).
- F. Entrances to private streets or project shall be a standard driveway approach, unless otherwise approved by the City Engineer.
- G. Where sidewalk serves a maintenance access road instead of a standard driveway approach the sidewalk shall be reinforced by 6 x 6 #10 welded wire mesh, the reinforcement will be extended 5' nominally on either side of the limits of the access road width. The thickness of sidewalk in this area shall be 6" thick.

3.1.4 Pavement Section - The design of the structural section shall be done by a qualified soils engineer and shall be based on:

- A. The effects of traffic as expressed by the Traffic Index as shown on Sheets 3-27 and 3-28 of the Standard drawings.
- B. The R-value of the subgrade derived from the Standard Stabilimeter Test (Test Method No. Calif. 301). Sufficient samples shall be tested to represent all of the streets within the project. An R-value of 5 shall be used, if no soils tests are determined necessary by the Engineer.

- C. The pavement section thickness shall be determined using the California Design (Hveem) method and based on the relationship of traffic, the tensile property of the material comprising the structural section and the strength characteristics of the particular layer under consideration.
- D. The structural section shall not be less than 2.5 inches asphalt over 8 inches aggregate base.
- E. Street and Alley Overlay

The minimum overlay thickness of street and alley shall be 1.5 inches and maximum grading for the aggregate shall be 1/2 inch.

3.1.5 Lighting

- A. Street Lighting - The street lighting system shall be underground fed unless otherwise specified and shall consist of conduit, integral ballast, luminaries, high pressure sodium lamps, metal standard (Upsweep bracket arm or mast arm), wires, all necessary grounds, photo electric switches, concrete foundations, pull boxes, and all other materials, labor and equipment and charges required to construct a complete and operating street light system.

The information given in the following table is general design criteria and is subject to change if in the opinion of the City Engineer, an alternate type of lamp, wattage, mounting height, arm length or spacing is more suitable for a particular location. Also refer to Drawings Nos 3-24, 3- 25 and 3-26.

ROADWAY ILLUMINATION TABLE (HIGH PRESSURE SODIUM)

ROADWAY CLASSIFICATION	R/W (FEET)	MIN. Av. FC	UNIFORMITY Av FC/Min FC	WATTS
------------------------	------------	-------------	-------------------------	-------

- B. Design - The street lighting system shall be shown on the project improvement plans or utility plans. The plans shall include the following items:
 - Location of electroliers
 - Location of pull boxes
 - Intensity of luminaries
 - Size and length of wire and conduit (shown in tabular form)
 - Mounting height and arm length
 - Transverse light distribution pattern
 - Location of service points(both primary and secondary)
 - Street light number

Transverse Distribution Pattern

<u>Curb-to-Curb Width</u>	<u>Type</u>
Less than 30'	II
30' to 45'	III
Greater than 45'	IV

C. Luminaires - General Notes

1. All luminaires shall be high pressure sodium vapor luminaires.
2. Photoelectric control shall be weatherproof dual voltage photoelectric relay with twist lock receptacle integral with luminaire.
3. Ballast shall be regulator type with 90% power factor per Section 86-6.01A, Caltrans Standard Specifications.
4. Light control shall be semi-cutoff, vertical light distribution pattern shall be medium, and transverse light distribution pattern shall be per plans.
5. All luminaires shall have optical filter system.

Note: Public street lighting is being furnished by PG&E to the City under PG&E Lighting Schedule LS-2B.

3.1.6 Bus Parking Bay - Bus parking bay shall be constructed off the normal roadway section. Bus parking bays shall be provided on high volume streets, narrow streets or high speed streets to provide for increased merging and boarding safety. Design of bus parking bay shall provide for acceleration and deceleration on pavement areas separate from the through traffic lanes. Refer to Standard Drawing No. 3-18. Location of bus parking bays shall be approved by the Engineer.

3.1.7 Bike Lane - Bike lane shall be per Standard Specification, Standard Drawings and Drawing No. 3-38 and as shown on plans.

3.2 Streets Material Standards

3.2.1 Portland Cement Concrete - Portland cement concrete shall conform to Section 90 of the Standard Specifications.

3.2.2 Paint - Paint shall conform to Section 91 of the Standard Specifications.

- A. White Traffic Paint shall be 250 (volume organic compound) Pervo No. 5940 or approved equal.

B. Yellow Traffic Paint shall be 250 V.O.C. Pervo No. 5941 or approved equal.

3.2.3 Pavement Markers - Pavement markers shall conform to Standard Specifications Section 85.

3.2.4 Thermoplastic Material - Thermoplastic material shall conform to Section 84 of the Standard Specifications.

3.2.5 Asphalts - Asphalts shall conform to Section 92 of the Standard Specifications.

3.2.6 Liquid Asphalts - Liquid asphalts shall conform to Section 93 of the Standard Specifications.

3.2.7 Asphaltic Emulsions - Asphaltic emulsions shall conform to Section 94 of the Standard Specifications.

3.2.8 Corrugated Metal Pipe Casing - Corrugated metal pipe casing shall comply with the applicable requirements of the Standard Specifications.

3.2.9 Steel or Concrete Pipe Casing - Steel or concrete casing if used under State Highway shall be approved by the Division of Highways prior to use.

3.2.10 Timber Piling - Timber piling shall comply with the applicable requirements of the Standard Specifications.

3.3 Street Construction Standards

3.3.1 Existing Facilities - Before start of any underground work, notify all utility companies or Underground Service Alert and obtain field location markings of facilities ten (10) days prior to commencing construction. Attention is directed to Section 15 of the Standard Specifications as supplemented herein.

Before any excavation in City streets obtain from the office of the Public Works Director a Street Excavation Permit in accordance with the requirements of Chapter 10.08 of the Municipal Code.

Before constructing pavement restorations the edge of the existing pavement shall be neatly sawcut to lines outside the disturbed or damaged pavement, and all shattered, broken, or loose material removed from the site. The subgrade shall be excavated and thoroughly compacted for six (6) inches below the bottom of the base material of the pavement adjacent to the area to be re-stored. The thickness of the pavement base course to be reconstructed shall be the thickness of the existing base plus one (1) inch and compacted to 95% relative density by mechanical methods. The type and thickness of surfacing to be reconstructed shall be the type and thickness of that which is existing. In no event, however, shall restored pavement be less than ten (10) inches of base

material and three (3) inches of surfacing or its equivalent based on Section 3.1.4 of these Specifications.

3.3.2 Clearing and Grubbing - Attention is directed to Section 16 of the Standard Specifications.

3.3.3 Watering - Furnishing and applying water shall conform to Section 17 of the Standard Specifications as modified herein. Water for use in the work may be taken from metered fire hydrants along the site after the Contractor has obtained the proper permit of the Commercial Office of the Water Division.

3.3.4 Dust Palliative - Attention is directed to Section 18 of the Standard Specifications as modified herein, and to Section 2.5.7 of these Specifications concerning dust control.

3.3.5 Earthwork

3.3.5.1 General - Earthwork shall conform to Section 19 of the Standard Specifications and as supplemented herein.

3.3.5.2 Compaction Test - Compaction tests shall be required on all engineered fills, subgrade, subbase course, base course and trench backfill. The project soils engineer shall furnish to the City test results in written form and the contractor will be permitted to proceed with the subsequent work only if the compaction tests meet the relative compaction requirements for the particular course under consideration.

3.3.5.3 Trench Excavation

1. Trench Excavation - Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water necessary to construct the work as shown. Unless otherwise indicated on the drawings or permitted by the Engineer excavation for sewers shall be open cut. Trenching machines may be used, except where their use will result in damage to existing facilities.

Except as permitted by the Engineer, the trench at the end of the day shall not be excavated more than 100 feet in advance of pipe laying, nor left unfilled for more than 100 feet where pipe has been laid.

If the trench is excavated below the bottom grade required by the Plans, it shall be filled to grade at the Contractor's expense with Class II aggregate base according to the Standard Specifications, Section 26- 1.02B, or other acceptable material as approved by the Engineer.

2. Trench in Existing Pavement - Where trenching operation is to be done through existing bituminous pavement, the sidelines of the trench shall be scored or

sawcut through the surfacing so that trenching operations shall cut through the existing pavement to clean, straight lines leaving no loosened paving or ragged edges. The trench in the existing pavement shall be cut twice. First at the initial trench width and then after the trench is backfilled to subgrade, another cut shall be made one foot beyond the edge of the broken asphalt concrete. See Drawing No. 3-19.

Existing concrete pavement, curbs, gutters, sidewalks, or driveways shall be removed by saw cut. If a sawcut in pavement falls within four (4) feet of a construction joint, cold joint, expansion joint or edge, the concrete shall be removed and replaced to the joint or edge. Saw cuts and removal of sidewalks, curbs, gutters, and driveways shall conform to Section 3.3.37 of these Specifications.

The materials excavated from the trench shall be so placed as to offer minimum obstruction to traffic. Gutters shall be kept clear or other provisions shall be made for handling street or road drainage.

3. Trench Width - The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus 16 inches, and such maximum width shall be inclusive of all trench timbers.

The trench shall be braced and drained so that the workmen may work safely and efficiently therein.

It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels or a storm drain system.

The trench shall be so excavated that the pipe can be laid to the alignment and depth required.

The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as hereinafter specified. Trenches shall be of such extra width, when required, as will permit the proper placing of timber supports, sheeting and bracing and handling of pipe, fittings, etc.

The minimum width of the trench shall be not less than eighteen (18) inches in width for a pipe 8 inches in nominal diameter, and shall be equal to the outside diameter of the pipe plus twelve (12) inches for pipe over 8 inches in nominal diameter.

If, for any reason, the width of trench measured at the top of the pipe (inclusive of any timbering or other trench supports) is excavated to a width greater than the designed width as shown on the Plans or in the Specifications, and if the design load on the pipe will be exceeded, one of the following shall control:

- a) Shape bottom of trench to increase pipe support.
 - b) Combination of bedding and partial concrete encasement to increase pipe support.
 - c) Complete concrete encasement to increase pipe support. In no case shall the design load on the pipe be exceeded. Where concrete encasement is used the concrete shall contain at least 376 pounds of cement per cubic yard, and have a slump not to exceed 4 inches.
4. Subgrade in Poor Soil - Where soft or yielding material or other detrimental condition is encountered at the bottom of any trench or excavation which, in the opinion of the Engineer, shall not provide a satisfactory or firm bearing for the pipe, such materials shall be removed for the full width of the trench or excavation until firm material is reached. The space so excavated shall then be refilled with Class 2 aggregate base thoroughly compacted with mechanical tampers in layers four inches (4") thick after compaction so as to provide a uniform and continuous bearing and support for the pipe at every point between bell and coupling holes.
5. Subgrade in Rock - Where ledge rock, boulders or large stones are encountered at the bottom of any trench or excavation, such material shall be removed to provide a clearance of at least six inches (6") below and on each side of all pipe, valves and fittings refilled with Class 2 aggregate base rock thoroughly compacted with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell or coupling holes.
6. Bell Holes - Bell holes shall be excavated on the sides and bottom on the trench at pipe joint locations, of such size that the process of making joints and inspection can be carried on satisfactorily and so that the pipe barrel shall bear evenly on the bottom of the trench.

Bell holes shall be so excavated that the bell of the pipe shall not support the weight of the pipe. The use of blocks to support the pipe shall not be permitted except when expressly agreed to by the Engineer.

7. Barricades and Lights - To protect persons from injury and to avoid property damage, adequate barricades, construction signs, lights, beacons and guards shall be placed and maintained during the progress of the construction work until it is safe for pedestrian and vehicle traffic. All material, piles, equipment, and pipe which may serve as an obstruction to traffic shall be protected by placing and maintaining proper barricades and lights when visibility is poor.
8. Trench Bracing - Excavation shall be supported as set forth in the rules, orders and regulations, State Construction Safety Orders. Sheet piling and other

timbers shall be withdrawn to prevent additional backfill that might overload the pipe. No bracing shall be removed from backfill after compaction.

9. Control of Water - The Contractor shall furnish, install and operate all necessary machinery, reasonably free from water during construction and shall dispose of the water so as not to cause injury to public or private property, or to cause or menace to the public. He shall at all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies and shall have available at all times competent mechanics for the operation of all pumping equipment. During pouring of concrete and until concrete has set hard, excavations shall be kept free of water. Discharge of any liquids or other materials from the trench or other construction activity into the storm or sanitary sewer systems requires Vallejo Sanitation and Flood Control District approval prior to such discharge.
10. Disposal of Excess Excavated Materials - All excavated materials not suitable or required for trench backfill shall be disposed of by the Contractor in a City approved location.

Broken concrete, paving, large stones and vegetable material are considered unsuitable for backfill and shall be disposed of by the Contractor.

11. Line and Grade Stakes

Line and grade stakes conforming with the Plans and Profiles will be set by the Contractor's Engineer on an offset line parallel to each main or other structure at convenient spacing. Prior to commencing work by the Contractor, the project engineer shall furnish to the Inspector a cut sheet giving the layout and the elevation of the work with respect to said line and grade stakes. These stakes and marks shall be carefully maintained by the Contractor in place until that portion of the work and improvement for which said stakes and marks were set has been completed, inspected and approved by the Inspector and if disturbed, shall be replaced by the Contractor's Engineer. All work shall conform to the cut sheet or revision thereof furnished to the Inspector.

3.3.5.4 Bedding - Bedding shall be defined as that material under the pipe providing firm and continuous support to the pipe couplings.

Except where concrete or clean natural sand is specified, bedding material supporting the pipe or conduit shall be Class II A/B as specified in these specifications.

When water is encountered in the trench, pipes shall be laid over a minimum of six (6) inches of Type I bedding. The trench shall be kept dry until placing of bedding, material, applying and jointing the pipe have been completed, inspected and approved.

When construction takes place in a dry trench and above the ground water table, a minimum of six (6) inches of Class II A/B bedding shall be provided below the pipe.

Bedding shall be true to grade and thoroughly compacted by tamping to a minimum relative density of 90% as determined by ASTM Designation D-1557 before the pipe is laid.

3.3.5.5 Bedding and Backfill Materials

1. Type I bedding shall meet all of the quality requirements of Section 26-1.02B of the Standard Specifications for Class 2 aggregate base and shall have the following grading:

<u>U.S. Standard Sieve</u>	<u>Percent Passing</u>
1 1/4"	100%
3/4"	5%

2. Type II bedding shall be Class 2 aggregate base, 3/4" maximum grading and shall have the quality requirements as specified in Section 26-1.02B of the Standard Specifications.
3. Select backfill shall be Class 2 aggregate base, 3/4" maximum grading and shall have the quality requirements as specified in Section 26-1.02B of the Standard Specifications.
4. Native Material for backfill shall be material obtained from project excavation and shall be clear of all organic matter, rubbish, debris and other objectionable material and shall contain no rocks larger than three (3) inches in any dimension.
The Engineer may approve an alternate bedding and backfill material.

3.3.5.6 Trench Backfill

1. General - Initial backfill shall be placed on the bedding material, around the pipe, and to a depth of one (1) foot over the top of the pipe. Also refer to Drawing No. 3-19.

Subsequent backfill shall be that backfill placed above the initial backfill to the ground surface or roadway subgrade.

Backfill shall not be placed until the facility in the trench has been inspected and approved for backfilling by the City Inspector. Once approval has been given, the contractor shall proceed as soon as possible with backfilling operations.

Compaction test for each lift of backfill shall be required on backfill over trenches. Test results in written form from the project soils engineer taking the test shall be provided to the City Inspector and shall meet the compaction requirements specified in this section prior to the contractor proceeding with subsequent work over the backfill.

2. Densification Methods by Mechanical Method

- a. Backfill shall be mechanically compacted by means of tamping, rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers. All such equipment shall be of size and type approved by the Engineer. Impact type pavement breakers (stompers) will not be permitted over clay, cast iron or non-reinforced concrete pipe.

Material for mechanical compacted backfill shall be placed in lifts which prior to compaction shall not exceed the depths specified below for the various types of equipment;

1. Impact, free fall or stomping equipment -maximum lift depth of 3 feet.
2. Vibratory equipment including vibratory plates, vibratory smooth wheel rollers and vibratory pneumatic-tired rollers - maximum lift depth of 2 feet.
3. Rolling equipment, including sheepsfoot (both vibratory and non-vibratory), grid, smooth-wheel (non-vibratory), pneumatic-tired (non-vibratory), and segmented wheels - maximum lift depth of 1 foot.
4. Hand directed mechanical tampers - maximum depth of 4 inches.

Mechanically compacted backfill shall be placed in horizontal layers of such depths (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary) and then tamped or rolled until the specified relative compaction has been obtained.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent grounds, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard.

3. Backfill Placement Requirements

- a. Existing Paved Street

Initial backfill shall be select backfill as specified in these Specifications and shall be thoroughly compacted by tamping to 90% relative compaction as determined by test method No. California 216E before further backfilling will be permitted.

Subsequent backfill shall be select backfill as specified in these Specifications and shall be compacted by mechanical compaction vibration or by combination of mechanical compaction and vibration.

Backfill shall have a minimum relative compaction of ninety percent (90%) as determined by Test Method No. Calif. 216 except in the upper 2.5 feet measured from finish grade, relative compaction of backfill shall not be less than 95%.

After trench is properly backfilled, a temporary layer of asphalt cutback shall be placed over the compacted subgrade to grade. This temporary cut-back shall be maintained by the Contractor until permanent paving is installed.

The type and thickness of surfacing to be placed over a properly backfilled trench in existing paved area shall be the type and thickness of that which is existing plus one (1) inch.

4. Street Right-of-Way in Previously Undeveloped Land

Initial backfill shall be select backfill as specified in these Specifications and shall be thoroughly compacted by tamping to a minimum relative compaction of 90% as determined by Test Method No. Calif. 216.

Subsequent backfill may be native material and shall be densified by mechanical methods to a minimum relative compaction of 90% as determined by Test Method No. Calif. 216 except in the upper 2.5 feet measured from finish grade, backfill shall have a minimum relative compaction of 95%. See Drawing No. 3-19.

3.3.6 Adjustment of Manhole Frame - Manhole frames and within asphaltic concrete pavement area shall not be set to finish grade until the pavement has been completed. The manhole openings shall be temporarily covered by suitable means during the construction of the subgrade, sub-base and base courses and the spreading and rolling of the asphalt concrete.

After the pavement has been completed, the necessary portion of the subgrade, sub-base, base and pavement shall be neatly cut away, the manhole built up and the frame set to finished grade of the adjacent pavement. See Drawing No. 3-16.

The surrounding area from which the pavement, base, sub-base or subgrade has been removed shall be backfilled to within 1 1/2 inches of the surface with Portland cement concrete. The remaining 1 1/2 inches shall be backfilled with asphalt concrete and compacted.

In the case of Portland cement concrete pavement, manhole frames shall be set to finish grade before paving.

Compaction of base course shall conform to Section 26-1.05 of the Standard Specifications.

3.3.7 Subgrade Preparation - Subgrade preparation consists of preparation of natural, filled or excavated roadbed material prior to the placement of sub-base or base material, pavement, curbs and gutters, driveways, sidewalks or other roadway structures.

Subgrade preparation shall conform to Section 19 of the Standard Specifications. Special attention should be directed to Section 19-5 of said Specifications pertaining to compaction.

When curb and gutter, driveways or sidewalks are to be placed on the subgrade material outside the travel way, the top 6 inches of such subgrade material shall be compacted to a relative compaction of not less than 90%.

After compaction and trimming, the subgrade shall be firm, hard and unyielding.

3.3.8 Finishing Roadway - Finishing roadway shall conform to Section 22 of the Standard Specifications.

3.3.9 Aggregate Sub-Bases - Aggregate sub-bases shall be Class 2 unless otherwise indicated in the special provision and shall conform to Section 25 of the Standard Specifications.

3.3.10 Aggregate Base - Aggregate base shall conform to Section 26 of the Standard Specifications and as supplemented herein.

Aggregate base shall be Class 2, 3/4" or 1 1/2" maximum. The percentage moisture in the aggregate shall be approximately 7% or as ordered by the Engineer to give maximum compaction.

Material placed in trench sections too narrow to accommodate a regular road roller shall be thoroughly compacted by means of pneumatic tampers or by other methods approved by the Engineer.

3.3.11 Cement Treated Bases

Cement treated based shall conform to Section 27 of the Standard Specifications.

3.3.12 Penetration Treatment

A. Prime Coat

When required, prime coat shall be applied to all un-treated aggregate base twenty-four (24) hours prior to placing asphaltic surfacing. Prime coat shall be liquid asphalt grade MC-250, and shall be applied at a rate of approximately 0.25 gallon per square yard. If excess liquid asphalt remains on the surface of the base after the 24-hour penetration period, a thin layer of sand shall be spread over the "fat" spots. All loose sand shall be completely removed from the treated area before any surfacing material is placed thereon. See Section 36 of the Standard Specifications for other requirements.

Prime coat will be paid for at the contract price per ton for the designated grade of liquid asphalt used unless otherwise specified in the special provisions.

- B. Tack Coat (Paint Binder) - A tack coat shall be applied to existing asphaltic or concrete paved surface and to those areas designated by the Engineer prior to placing a new asphalt surfacing on it. Tack coat shall be SS-1 grade asphalt emulsion diluted with water and applied at a rate of 0.02 - 0.10 gallon per square yard. No greater area shall be treated in any one day than will be covered by the asphalt concrete during the same day. See Section 36 of the Standard Specifications for additional requirements.

3.3.13 Bituminous Seals

- A. Seal Coat - Where called for in the plans or special provisions, a seal coat shall be applied to existing pavements. The grade of liquid asphalt, the method of application and payment for seal coat shall conform to Section 37 of the Standard Specifications.
- B. Fog Seal - Fog seal shall be applied to all new asphaltic concrete pavements within 24 hours of final paving unless otherwise specified in the special provisions. Fog seal shall consist of SS-1 grade asphalt emulsion diluted to 50% with water and applied at a rate of approximately 0.05 gallons per square yard.

Fog seal shall be paid for as provided in Section 37 of the Standard Specifications.

3.3.14 Road Mixed Asphaltic Surfacing - Road mixed asphaltic surfacing shall conform to Section 38 of the Standard Specifications.

3.3.15 Asphaltic Concrete - Asphaltic concrete for pavement shall conform to Section 39 of the Standard Specifications. It shall be Type B with bituminous binder of steam refined paving asphalt of AR4000 penetration, 3/4 inch maximum "medium" grading for the aggregate. The surface coarse asphalt shall be 1/2 inch aggregate.

Placing of the asphaltic concrete adjacent to the lips of gutters shall be such that a rise above said lips of 1/4 inch shall re-main after compaction.

Asphalt concrete pavement shall be compacted to a relative density of at least 95 percent.

3.3.16 Full Depth Asphalt Concrete

- A. General - Full depth asphalt pavement is an asphalt pavement in which asphalt mixtures are employed for all course above the subgrade. Full depth asphalt pavement section shall have a minimum thickness of seven (7) inches. The top two (2) inches of the section is the surface course. All asphaltic concrete below this point is considered base course. A tack coat shall be applied to the base course prior to placement of the surface course. Subgrade shall have a relative compaction of not less than 95 percent.
- B. Material - Asphalt concrete shall be Type B 3/4 inch maximum, medium grading aggregate for the base course and 1/2 inch maximum, medium grading aggregate for the surface course and shall conform to the provisions of Section 39 of the Standard Specifications.
- C. Placement & Compaction - The base course shall be spread and compacted in layers not to exceed five (5) inches in compacted thickness by any method which will achieve the required finished grade and a relative compaction of not less than 95 percent. The finish base course at any point shall not vary more than 0.05 foot above or below the grade established by the Engineer.

If soft spots in the subgrade are encountered and required compaction cannot be obtained, that area shall be removed to a depth approved by the Engineer and then brought back to grade with asphalt concrete. All mixture shall be spread, and the first coverage of initial or breakdown compaction shall be performed when the temperature of the mixture is not less than 250 degrees F.

Base course compaction shall be completed when the temperature of the mixture is at 180 degrees F.

Placement and compaction of surface course shall con-form to Section 39 of the Standard Specifications.

3.3.17 Portland Cement Concrete Pavement - Portland cement concrete pavement shall conform to Section 40 of the Standard Specification, and as supplemented herein.

Spreading concrete between the side forms on alleys will not re-quire a spreading machine. The spread concrete shall be vibrated by some method that produces equivalent machine results without segregation. The rate of vibration shall not be less

than 3500 vibrations per minute and the amplitude of vibration shall be sufficient to be presentable on the surface of the concrete more than one foot from the vibrating element.

Compacting and shaping alleys shall be performed with a hand tamper constructed of a heavy plant whose length exceeds the width of pavement by a minimum of one foot; shall be shod with a heavy strip of metal for a tamping surface; and shall be stiffened adequately to maintain the required shape during use.

The hand tamper shall be used with a combined tamping and longitudinal motion raising it from side form and dropping it to consolidate the concrete.

A surplus of concrete shall be kept in front of the tamper and tamping shall continue until the required cross-section is obtained and the mortar flushed slightly to the surface.

Where hand compaction is performed on grades in excess of five (5) percent, a light strike board constructed similar to the heavy tamper shall be used following the heavy tamper to correct any displacement caused by the flow of the concrete.

3.3.18 Pavement Sub-Sealing - Pavement sub-sealing shall conform to Section 41 of the Standard Specifications.

3.3.19 Piling - Piling shall conform to Section 49 of the Standard Specifications.

3.3.20 Pre-stressed Concrete Members – Pre-stressed concrete members shall conform to Section 50 of the Standard Specifications.

3.3.21 Concrete Structures - Concrete structures shall conform to Section 51 of the Standard Specifications.

3.3.22 Reinforcement - Reinforcement shall conform to Section 52 of the Standard Specifications.

3.3.23 Air Blown Mortar - Air blown mortar shall conform to Section 53 of the Standard Specifications.

3.3.24 Waterproofing - Waterproofing shall conform to Section 54 of the Standard Specifications.

3.3.25 Steel Structures - Steel structures shall conform to Section 55 of the Standard Specifications.

3.3.26 Sign Structures - Sign structures shall conform to Section 56 of the Standard Specifications.

3.3.27 Timber Structures - Timber structures shall conform to Section 57 of the

Standard Specifications.

3.3.28 Preservative Treatment - Preservative treatment shall conform to Section 58 of the Standard Specifications.

3.3.29 Painting - Painting shall conform to Section 59 of the Standard Specifications.

3.3.30 Reinforced Concrete Pipe - Reinforced concrete pipe shall conform to Section 65 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue. The size and class of pipe shall be specified in the Special Provisions.

3.3.31 Corrugated Metal Pipe - Corrugated metal pipe shall conform to Section 66 of the Standard Specifications.

3.3.32 Structural Plate Pipe, Arches and Pipe Arches - Structural plate pipe, arches and pipe arches shall conform to Section 67 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.33 Sub-Surface Drains - Sub-surface drains shall conform to Section 68 of the Standard Specifications.

3.3.34 Oversize Drains - Oversize drains shall conform to Section 69 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.35 Miscellaneous Facilities - Miscellaneous facilities shall conform to Section 70 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.36 Sewers - Sewers shall conform to Section 71 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

Backfill material shall conform to Section 3.3.5.5 of these Specifications.

3.3.37 Slope Protection - Slope protection shall conform to Section 72 of the Standard Specifications and the Vallejo Sanitation and Flood Control District Standard Specifications, current issue.

3.3.38 Curbs, Gutters, Sidewalks, Driveways & Islands

A. Portland cement concrete curbs, gutters, sidewalks, driveways and islands shall conform to the details on the Plans and to the provisions of Section 73 of the Standard Specifications and as supplemented herein (Class "B" concrete).

1) Existing sidewalks, curbs and gutters - In lieu of the provisions of Section 73 of

the Standard Specifications, the removal of only the sidewalk portion of an existing monolithic pour of curb, gutter, and sidewalk will be allowed to repair a broken sidewalk. The removal of the curb and gutter may be required when installing or removing a driveway approach, the entire approach including curb and gutters must be removed before replacing with new sidewalk, curb and gutter. Where existing sidewalk, curb and gutter must be removed, the section to be removed will be cut at a minimum depth of 4 inches with an abrasive type saw at the nearest score mark. If, when removing the concrete some of the remaining concrete gets cracked or broken it must be resown at the nearest score mark and removed.

- 2) Concrete sidewalk, curb and gutter driveway and island construction - Concrete sidewalks to be constructed adjacent to existing curb and gutter shall be anchored to the existing curb by means of dowels of No. 4 reinforcing steel or approved anchor bolts at twenty four inches (24") on center.

When the construction of sidewalk and curb and gutter is non-monolithic, the sidewalk and driveway entrances shall be anchored at the back face of the curb and a dowel of No. 4 reinforcing steel shall be placed at twenty-four inches (24") on center. See Standard Drawing No. 3-8.

Concrete curb constructed over an existing pavement shall conform to Section 73-1.05 of the Standard Specifications.

Forms for sidewalk, curb and gutter, driveway and island construction shall conform to Section 73-1.04 of the Standard Specifications.

Subgrade preparation for concrete curbs and gutters, sidewalks and driveway, shall conform to the requirements of Section 3.3.7 of these specifications.

A two inch Class 2 aggregate base shall be placed under all concrete curbs, gutters, sidewalks, driveways and islands. The aggregate base shall be compacted to a minimum of 90% relative compaction as determined by Test Method No. Calif. 216 and thoroughly watered after placing. Fine grading below the bottom plane of the aggregate base may be constructed with aggregate base fill.

Aggregate for Class B concrete shall conform to the grading for 1 1/2 inch maximum combined aggregate.

Weakened plane joints shall be used at the beginning and the ending of a return, in aprons as shown on the City of Vallejo Drawings and at the top of the roll on each side of a driveway entrance. Expansion joints shall also be placed between the public walks and the private walks and driveways.

Expansion joint material shall be pre-molded fillers 1/2 inch thick. The expansion

material used in the curb and gutter section shall be one solid piece shaped to the cross section of the curb and gutter. The material used in the side-walk shall be 1/2 inch thick, by 4 inches wide and the length of the walk width.

Weakened plane joints shall be placed every 12 lineal feet transversely along the sidewalk, curb and gutters or as otherwise directed by the Engineer. The joints shall be 1/4 the depth of the concrete.

Score markings shall be placed every four (4) lineal feet transversely along the sidewalk, and in no case shall the scored squares occupy more than sixteen (16) square feet. Score markings shall match as nearly as possible those in adjacent existing curbs, gutters and sidewalks, or shall be placed as directed by the Engineer.

Finished sidewalk, curb and gutter, driveway and island shall conform to Section 73 of the Standard Specifications.

Backfill along the back of the newly constructed sidewalk to the finished sidewalk grade must be completed before acceptance of the work.

- 3) Extruded curb, gutter & sidewalk construction -Extruded curb, gutter and sidewalk construction shall conform to Section 73-1.06 of the Standard Specifications except as modified herein.

Sidewalk, curb and gutter may be placed by using an extrusion machine where the grade of the finished curb, gutter and sidewalk is greater than one percent (1%).

Class B concrete shall be used with combined aggregate conforming to 1 1/2 inch maximum grading.

Guidelines for extrusion machine shall be supported at no greater than fifteen feet (15') interval on tangent sections. For horizontal curve sections, guides shall be supported at such intervals that the finished curb, gutter and sidewalk is of uniform width, free from humps, sags or other irregularities.

- B. Asphalt concrete sidewalks and driveways shall be approved by the Public Works Director prior to construction and shall conform to the details on the plans and as supplemented herein.
 - 1) Existing sidewalks, curbs & gutters - Replacement of existing Portland cement concrete sidewalks and driveways with asphalt concrete sidewalk and driveways will be permitted only when entire block frontages are replaced. Permanent patches with asphalt concrete will not be permitted.
 - 2) Asphalt sidewalk & driveway construction - Asphalt sidewalks and driveways

shall be comprised of two and one-half (2.5) inches asphalt concrete over four inches and six inches of compacted Class II aggregate base respectively. Asphalt concrete shall be Type B 1/2 inch maximum, medium grading and shall conform to the provisions of Section 39 of the Standard Specifications. Subgrade preparation for asphalt sidewalks and driveways shall conform to the requirements of Section 3.3.7 of these Specifications. Backfill along the back of the newly constructed sidewalk to the finished sidewalk grade must be completed before acceptance of the work.

3.3.39 Standard Sign Installation

- A. Traffic Signs - Traffic regulatory, warning and directional signs shall be furnished and erected in locations as shown on improvement plans. For sidewalks greater than four (4) feet wide, the centerline of the post for traffic signs shall be eighteen (18) inches from the face of curb. Where the sidewalk width is four (4) feet or less, the traffic signs shall be installed at the back of the sidewalk, the centerline of the post for traffic signs shall be eighteen (18) inches from the back of the sidewalk. Said signs shall conform in size, shape, material, color, and design to the signs as shown in the current Traffic Manual of the Department of Transportation, State of California, and as supplemented herein.

Signs shall be aluminum blank (0.080) gage minimum with a reflective sheeted face per State of California Specifications.

Pipe to which signs shall be attached shall be 2" (in-side diameter) galvanized steel pipe schedule 40. Length of said posts shall be as directed by the Engineer. Traffic sign posts shall be buried in the earth not less than 2 feet and when so required by the Engineer, shall be embedded in concrete.

1" x 1" x 1/8" brace required for unbalanced signs 30" and greater width.

Hardware shall be heavy duty aluminum of a type approved by the Engineer. See Drawings Nos. 3-30 to 3-33.

- B. Street Name Signs - Street name signs shall be located as shown on Improvements Plans.
1. Blade Material - All blades are to be flat, six inches in height with radius corners. The blades shall be .125 thick aluminum. The length of each blade will range from a minimum of 18 inches to a maximum of 36 inches, with the most common blade being 30 inches. If the street name is of such length that the sign exceeds these limits, the extra space needed will be provided for by reducing the distance between letters or condensing the print by a minimal amount. The finished blades shall have smooth, clean cuts at each end with no distortion. The blades are to be drilled to accommodate the hardware as shown on Drawing No. 3-36.

2. Layout - The blades shall be sheeted with 3M white reflective sheeting or approved equal. After sheeting they shall be silk screened transparent blue to expose a 1/4 inch margin, the City logo in white. All information regarding these requirements shall be obtained from the Traffic Engineer or his representative. The street name, suffixes, block numbers, and directional arrows shall be white reflective letters and numbers, 3M type or approved equal. The street name lettering shall be 4", white reflective, series B. The block numbers and suffix designation lettering shall be 1-1/2" white reflective, series B. The directional arrow shall be 1-3/4" x 1-3/4" white reflective.
3. Hardware - All hardware shall be of the heavy duty, slotted, bolt-through, vandal-proof type and meet the specifications shown on the enclosed drawings. See Drawing Nos. 3-35, 3-36.
4. Mounting - All street name signs shall be mounted on two inch (inside diameter), schedule 40, galvanized steel pipe, nine feet and no inches from the ground surface to the bottom of the lower sign on the assembly. Each sign post shall have one double faced sign for each street branch (two at normal full crossings). Wherever two streets intersect, or where any street bends more than 45 degrees, there shall be no less than one signpost and set of signs. The mounting pipe is to be set in concrete, six inches in diameter and eighteen to twenty-four inches deep. See Drawing No. 3-34. Street name signs, when combined with R1 stop sign, use stop sign location. Otherwise use far right side of major street. Two (2) signs required for four (4) leg intersection of major street.

All street names shall be approved by the City of Vallejo Fire, Police and Public Works Departments.

3.3.40 Fences - Fences shall conform to the provisions of Section 80 of the Standard Specifications.

3.3.41 Survey Monuments

A. Street Monument

1. General - This work consists of constructing concrete based cast iron covered survey monuments complete in place, where and as shown on the Plans, Drawings Nos. 3-21 to 3-23 and as herein specified.
2. Materials and Construction - Concrete bases shall be Class A Portland cement concrete conforming to the provisions of Section 51 and Section 90 of the Standard Specifications.

Cast iron frames and covers shall conform to the applicable provisions of Section 55 of the Standard Specifications.

Exact locations will be given by the Subdivision Engineer.

The brass discs pins or bench markers will be furnished and grouted in place by the Subdivision Engineer after completion of the monuments by the Contractor.

Attention is directed to Section 3.3.6 of this specification regarding construction of structures to final grade after the surfacing has been completed.

- B. Subdivision Boundary - The final subdivision map, record of survey, and parcel map shall be made by a registered civil engineer or by a licensed land surveyor who shall find or set a durable monument at every change in direction of the exterior boundary of the tract. The exterior boundary of the tract shall be monumented before the final map may be recorded. "Durable monument" shall be defined as one of the following:
1. An iron pipe not less than one and one-half (1 1/2) inches in outside diameter, not less than twenty-four (24) inches in length, set not less than twenty-four (24) inches in the ground, and with either a plastic survey monument marker affixed to the inside diameter of the pipe, or a concrete (mortar) plug not less than six (6) inches in length poured and tamped in the top of pipe. A galvanized metal nail shall be set in the top of the concrete plug.
 2. An iron reinforced rod (re-bar) not less than five-eighths (5/8) inch in diameter, not less than twenty-four (24) inches in length, set not less than twenty-four (24) inches in the ground affixed with a plastic survey monument marker.
 3. The registered license number of the engineer or surveyor shall be permanently indicated on the monument.
 4. Each final map subdivision shall provide one on-site monument with State of California Coordinate System.
- C. Interior Property Lines - All lot corners and angle points within the boundary of the subdivision shall be marked in the same manner as the exterior boundary or by other approved methods. Crosses (offset) cut in the top of curb will be acceptable.
- D. Benchmarks - Benchmarks elevations shall be at the top of the pin as shown on Standard Detail Drawing No. 3-32 and located at points shown on the as-built construction plans.

The Subdivision Engineer shall provide for establishment of permanent benchmarks within the limits of the subdivision project. The number of benchmarks to be set will be evaluated during the plan checking process. Benchmarks shall be set on well monuments at major street intersections, or as

determined by the City Engineer. Differential level notes, tied to the existing "city datum" shall be submitted with the as-built drawing. Level notes shall be dated and stamped with the registered license number of the engineer or land surveyor.

3.3.42 Markers - Markers shall conform to the provisions of Section 82 of the Standard Specifications. Markers for water line blow-offs and air valves on water transmission lines traversing open land shall be precast Portland cement concrete and shall conform to the dimensions and details shown on the Plans.

3.3.43 Guard Railings - Guard railings shall conform to the provisions of Section 83 of the Standard Specifications.

3.3.44 Traffic Stripes & Pavement Markings - Traffic stripes and pavement markings shall be thermoplastic material unless otherwise approved by the City Engineer.

3.3.45 Sandblasting - Sweeping service shall be provided during the sandblasting operation.

3.3.46 Barrier Posts - Barrier posts shall conform to the provisions of Section 83 of the Standard Specifications.

3.3.47 Signals & Lighting - Signals and lighting shall conform to the provisions of Section 86 of the Standard Specifications and as supplemented herein.

A. Signal Controller - Controller shall be a type 170 in-stalled in an anodized aluminum 332 cabinet.

1. Service cabinet shall be a Type III - BF, 120/240 volt, 100 amp split load, and shall conform to local utility requirements and specifications. The deadfront panel shall be hinged. The foundation anchor bolts shall be set so that the securing nuts are inside the service cabinet.

Service cabinet equipment:

Main - 100A, 120/240V 3P circuit breaker Signals (metered)

Circuit Breaker - 50A, 120V, 1P

Street Lighting (unmetered)

Circuit Breaker - 30A, 240V, 2P

Test Switch - 15A, 1P

Contactor - 60A, 2PNO Mercury Contactor Sign Lighting (metered)

Circuit Breaker - 15A, 120V, 1P

Test Switch - 15A, 1P

Contactor - 30A, 2PNO Mercury Contactor

2. Vehicle signal sections shall be metal. All vehicle signal sections shall be 12 inch unless otherwise specified. All vehicle signal assemblies shall have back plates.

3. Pedestrian signal faces shall be Type A. Front screens shall be 1 1/2" deep eggcrate or Z-crate type screen of 0.03 inch nominal thickness poly-carbonate. A visor is not required.
 4. Fittings, slip-fitters and terminal compartments shall be bronze. Screws shall be bronze.
 5. Inductive loop detectors shall be 2-channel Type 222B (Detector Systems or approved equal).
 6. Loop wire shall be Type XHHW, No. 14 stranded cop-per wire.
 7. Detector lead cable shall be Type B. Splices for detector lead cables shall be insulated using method C (handcrafted insulation). Shields shall be insulated at pull box end and terminated within the controller cabinet at the equipment ground.
 8. The sealant for filling detector slots shall be an asphaltic emulsion sealant.
 9. Pedestrian push buttons shall be Type B. Push button signs shall be installed using brass theft proof screws with PDL type hards. Installation tools shall be supplies to the City.
 10. Internally illuminated street name signs shall be installed for each leg of the signalized intersection unless otherwise specified. Signs shall be Type A.
 11. Photoelectric control for street name signs shall be integral with the photoelectric control for street lighting except that separate contactors shall be used.
 12. Photoelectric control shall be Type II.
- B. Electrical Equipment - All materials used shall bear the label of the Underwriters Laboratories, Inc., and all work performed shall conform to the Standards of the National Electric Manufacturers' Association, and, in addition to the requirements of the plans and special provisions, all materials and work shall conform to the requirements of the National Electric code, hereinafter referred to as the Code; the Electrical Safety Orders of the Division of Industrial Safety, Department of Industrial Relations of the State of California, and the rules for overhead and underground line construction of the California Public Utilities Commission; local ordinances of the City of Vallejo, California, regulations of the local utilities and to the satisfaction of the City Engineer of the City of Vallejo, California, or his authorized representative.
- C. Location of Lighting Standards - All standards shall be placed on concrete bases, as hereinafter specified. The base shall so be constructed that the centerline of

the standard shall be no more than three (3) feet (unless otherwise stated) behind the sidewalk. The location of the base shall be approved in the field by the Inspector before the forms are constructed. The base shall be located behind the sidewalk except when the sidewalk is wider than 6.0 feet. In this case, the centerline of the standard shall be 2' behind the face of the curb. See Drawing No. 3-24.

- D. Foundation for Electrolier Standards - The foundation shall conform to these provisions as well as the applicable provisions of Section 86 of the Standard Specifications.

The foundation shall be a cylinder two feet 6 inches (2'6") in diameter. The bottom of the foundation shall be five (5) feet below the top of curb and the bottom shall rest on firm ground. Where obstructions prevent the construction of the planned foundation, the Contractor shall construct an effective foundation satisfactory to the Engineer. Forms shall be true to line and grade, rigidly and securely braced in place, and they shall not be removed until the concrete has thoroughly set. When setting the forms, the Contractor shall place all conduit ends in their proper position and bond them securely together as mentioned herein. Both forms and foundations shall be thoroughly moistened before placing concrete. The finished foundation grade shall be at the level set by the Engineer and generally shall be at the grade of the top of sidewalk at that location. The initial pour of the foundation shall terminate five (5) inches below finish grade to facilitate the adjustment of the leveling nuts when erecting the standard. After the standard has been set in a vertical position, the five (5) inch space shall be filled with concrete and shall be extended to the junction box. Tie rods, bolts, nuts and other electrolier standard hardware shall be galvanized or cadmium plated unless otherwise specified herein or on the Plans. Anchor bolts and conduit shall be held in place by means of a template until the concrete sets and no bending of anchor bolts will be permitted thereafter.

- E. Conduit - All conductors shall be run in conduit except when in the lighting standard. Conduit shall be either Schedule 40 PVC or rigid metal type conforming to Articles 346 and 347 of the NEC. All metal conduit and fittings shall be zinc coated, inside and out, by the hot dip process. Each length shall bear the label of the Underwriters Laboratories, Inc.

Installation - The installation shall conform to the appropriate Article of the NEC. The ends of all conduit shall be well reamed to remove burrs and rough edges. When nipples or pieces of conduit are cut, the ends shall be reamed and made square. When the coupling is tightened, the ends shall butt or come together for the full diameter thereof.

Where two pieces of conduit are to be jointed together, a slip joint or running thread will not be permitted and an "Appleton" or other approved coupling shall be used. All threads on conduit shall be well painted with a good quality red lead

or P & B paint before couplings are put on and made up. All couplings shall be tightened until the ends of the conduit are brought together so that a good electrical connection will be made throughout the entire length of the conduit run.

Where coating on conduit has been injured in handling or installing, such injured places shall be thoroughly painted with P & B paint or equal.

All conduit ends shall be threaded and capped with standard pipe caps until wiring is started. When caps are removed, the threaded ends shall be provided with approved conduit bushings equipped with grounding lugs.

Conduit shall be bent to the proper radius (minimum 18") without crimping or flattening. Eight (8) inch minimum radius may be used at electrolier base.

The size of the conduit used shall conform to Article 346 of the NEC. The installation of PVC conduit shall conform to the Article 347 of the NEC. All cut ends shall be trimmed, inside and outside, to remove rough edges. All joints between lengths of conduit, and between conduit couplings, fittings and boxes shall be made by a method specifically approved for the purpose. Field bends shall be made only with bending equipment specifically approved for the purpose, and the radius of the curve of the inner edge of such bends shall not be less than shown on Table 346-10 of the NEC.

It shall be the option of the Contractor, at his expense, to use larger size conduit if desired, and where larger size conduit is used, it shall be for the entire length of the run from outlet to outlet. No reducing couplings will be permitted. The diameter of the conduit shall not be less than 1 1/2" inside diameter.

Backfill - Conduit shall be laid to a depth of not less than twenty-four (24) inches or greater than thirty-six (36) inches below the top of pavement when crossing the street and shall be placed at 18" depth and directly behind and adjacent to the back of side-walk when paralleling the street. No more than ten (10) feet of conduit shall be used to align the conduit from the back of the sidewalk to the junction box "knock out". The placing of conduit shall be within one (1) foot of the back of sidewalk around returns at intersections. Backfilling of conduit trenches by standard methods are required when placed under existing pavement and sidewalk. Conduit shall be placed by approved jacking methods. Pavement shall not be disturbed without the written permission of the Engineer, and then only in the event insurmountable obstructions are encountered. Jacking pits shall be kept two (2) feet clear of the edge of any type of pavement. Excessive use of water, such that pavement might be undermined or subgrade softened, will not be permitted. Each run of conduit (without conductor) shall be capped at the end.

- F. Conductor and Cable - All cable shall be in accordance with the Insulated Power Cable Engineers' Association Standard No. S-19-81, Appendix I.

All conductors shall be continuous from the junction box to junction box without splice. Conductors from secondary box to the pole box shall be No. 8 copper wire and from pull box to the luminaire shall be No. 10 copper wire. Splices are to be made only in junction boxes. All connectors shall be waterproof.

An inert lubricant shall be applied to conductors before pulling them into conduit. Where more than one cable is to be installed in the same conduit, they shall be drawn into the conduit at the same time to insure installation without injury to the insulation.

Two feet of slack shall be provided at all conductor ends and splices. Conductors shall be color coded according to pertinent sections of the NEC.

- G. Pull Boxes - The minimum size shall be State No. 3 1/2 for street lights and No. 5 for traffic signals. Pull boxes are located as shown on the plans. Under no circumstances shall pull length exceed 200 feet and a pull box at each street light location.

3.3.48 Street Trees - Street trees shall be installed in conformance with applicable ordinances of the City of Vallejo, Section 5 and Drawing No. 5-10 of this specification.

The types and size of trees to be planted shall conform to the "City of Vallejo Approved Tree List for Street and Median Planting" on file in the Public Works Director's Office.

- A. Trees shall be well established nursery stock. They shall be from fifteen (15) gallon containers or field grown stock of same quality and conform to A.N.S.I. standards. Trees shall have a well-developed taper from trunk base to tree crown. The height shall be minimum of six (6) feet and three quarters (3/4) of an inch. There shall be a nursery tag on each tree which denotes the scientific name.

Between November and February and option to install bare root street trees may be approved pursuant to an agreement with the City Engineer.

- B. Root Quality - Container grown and bare root plants shall have a well formed root system, branching shall be symmetrical and main roots should go down and out to provide trunk support. Plants should have fibrous roots sufficiently developed that the root mass will retain its shape and hold together when removed from the container or when handled during planting. The main roots should be free of kinked and circling roots in the trunk, surface and center root zone. Circling roots in the peripheral root zone should be thinned and straightened, however if peripheral roots are large, entwined and matted the tree will be rejected. The main roots of bare root plants should be sound and free from breaks, torn or bruised bark, crown gall, and nematodes. (Dr. Richard Harris, 1983. Arboriculture. Prentice Hall, Inc., Englewood Cliffs, New Jersey, pp. 62-64).

- C. Planting Pits - for street trees shall have a minimum diameter of four (4) times the container width. The depth shall be equal to the length of the root ball plus six (6) inches. The pit walls and floor shall be scarified to ensure that soil compaction and/or glazing does not occur. Plant pits shall be inspected by a City Landscape Inspector prior to installation.
- D. Planting Locations - Since plant spacings on landscape plans are diagrammatic, contractors should request that a City Landscape Inspector or City Arborist mark planting locations. Adjustments to the approved plan locations will be made based on proximity to utilities, easements, services, street lighting, obstructions and individual plant spread at maturity. Trees shall not be planted within six (6) feet of utilities (PG&E vaults, water and sewer lines, irrigation main lines) and twelve (12) feet of street lights.
- E. Tree Staking shall be installed as per the City of Vallejo's street tree planting detail. However, per the City Engineer's discretion tree staking may be eliminated on certain trees. Tree taper, caliper and stem rigidity will be used to evaluate which trees may be left unstaked. Stakes may be removed during the one year maintenance period upon request of City Arborist or City Inspector.
- F. Watering Well Removal - Tree and shrub watering wells shall be removed forty five (45) days after planting in irrigated landscapes.
- G. Diversity of Tree Species - No single species shall make up more than 15% of the total City tree population. This is to prevent uniform disease susceptibility and eventual uniform senescence. Therefore, the following requires a minimum for tree species variation for a given site.

<u>Number of Trees at Site</u>	<u>Min. Number of Tree Species to be Planted</u>
10 - 19 trees	One Species
20 - 39 trees	Two Species
40 - 69 trees	Three Species
70 - 99 trees	Four Species
100+ trees	Six Species

- H. Tree Stock Quality - Trees shall be well established nursery stock in five (5) and/or fifteen (15) gallon containers. Height and caliper standards shall conform to the following table:

Min. Dia. at Stem at 4' Height	Height Overall (Ft.) In.	Height From Ground to Branch: Min. Clearance	Max.
--------------------------------------	--------------------------------	---	------

<u>5 gallon</u>					
Feathered		3/4"	4'-0"-6'0"	18"-2'0"	6'
<u>15 gallon</u>					
Light Standard		3/4"	6'0"-8'0"	3'0"-4'0"	8'
Standard *	3/4"		7'0"-9'0"	3'0"-4'0"	9'

*Street Tree Size

Between November and February an option to install bare root or field grown balled and burlapped trees may be approved pursuant to an agreement with the Director of Public Works. Bare root trees shall be stored in soil only; no bark mulch or chips. For bare root and field grown trees standards for height and caliper, height and root ball sizes shall be in conformance with American National Standard Institute (ANSI) Z60.1, 1980.

- I. Structural - Trees shall have a well-developed taper from trunk base to tree crown. Low trunk lateral branches should be left on the tree since these "lower limbs nourish the trunk and shade it, resulting in a tree with greater caliper and taper". (Harris)

Main branches of a tree should have a uniform radial distribution and form wide angles of attachment with the trunk. Included bark between trunk and branches or branches with narrow angles or attachment will not be accepted.

Trees should not be topped, headed, or have co-dominant leaders. A tree's crown configuration shall have "one-half or more of the foliage on branches originating on the lower two-thirds of the trunk and one-half or less (of the foliage) on the upper one-third" (Harris). This type of branch (foliage) distribution will center the wind load acting of the tree and provide a uniform distribution of stress.

Trees should be free and disease. Tree foliage should be green to dark green, and shoot growth should be healthy and vigorous. Tree bark should be smooth and bright. "Rough, cracked, dull, and dark bark may be an indication of low vigor" (Harris). Tree trunks with sunburn or mechanical wounds are not acceptable.

- J. Grated Trees - Many tree cultivars have been grafted on to a related root stock. To ensure that grafted stock will have a stable union and to prevent the potential incompatibility between root stock and graft, the City requires that the root stock be of the same genus as the cultivar stock. Information on the name or designation of root stock should be obtained from the supplier and presented to the City inspector.

Tree Guards - All street trees installed in single family residential lots shall have a protective sleeve, known as an arbor guard, placed around the trunk base. This

perforated plastic spiral guard will provide protection to the basal region against string line and mower blight damage.

Labeling - When plans are delivered to the site, "at least one plant, cultivar, or species should be labeled with the correct botanical name" (Harris). If more than one clone of a species is delivered (i.e. Pyrus C. "Aristocrat" and "Cantilever"), every plant needs to be labeled.

3.3.49 Street Barricade - Street barricades shall be constructed at all dead end streets and at locations selected by the Engineer and shall conform to the Standard Detail Drawings No. 3-35 and No. 3-36. A W31 and Type "N-2" marking dead end reflector sign shall be mounted at the center of each barricade.

3.3.50 Traffic Control - Traffic control shall conform to Standard Specifications, Standard Plans and Caltrans Traffic Manual, unless otherwise approved by the City Engineer.

SECTION 4. WATER

4.1 Design Standards

4.1.1 Water System Design Guidelines

- 4.1.1.1 Fire flow and pressure requirements of the Fire Department shall be satisfied. Fire flow at no less than 25 psig residual pressure shall be available within 1000 feet of any structure. One half of the fire flow shall be available within 300 feet of any structure. For single family residential units, the fire flow is 1500 gpm. For commercial units the fire flow is 3500 gpm. For other developments, see the Vallejo Water System Master Plan, 1985, including any modifications/updates thereafter.
- 4.1.1.2 Fire hydrant placement and fire service installation, if any, shall meet the requirements of the Fire Department.
- 4.1.1.3 Fire flow velocity shall not exceed 10 feet per second.
- 4.1.1.4 Peak hour demand flow velocity shall not exceed 7 fps.
- 4.1.1.5 Hazen-Williams pipe roughness coefficient shall be C=110 for mortar lined pipe and C=120 for PVC
- 4.1.1.6 Mainline pipe sizes shall be six (6) inch minimum.
- 4.1.1.7 Easements shall be provided for water system improvements installed outside the public right of way; 15 feet wide for mains, 10 feet wide for meters, backflow devices, air valve, fire hydrants, double detector check valves, etc.
- 4.1.1.8 Fire hydrants shall be spaced at a maximum of 500 feet on streets or 1000 feet on parkways or as required by the Fire Marshal. Fire hydrants shall not be located at the ends of "cul-de-sacs."
- 4.1.1.9 Combination Air/Vacuum (CAV) relief assemblies shall be provided at all high points and as directed by the Engineer and shall be situated outside of travelled ways.
- 4.1.1.10 Systems shall be looped wherever possible.
- 4.1.1.11 Blow-offs shall be installed at all low points, zone valves at pressure zone boundaries and as required by the Engineer.
- 4.1.1.12 There shall be a minimum of 10 feet horizontal separation between water mains and sanitary or storm sewers. Waterlines shall generally cross above sewer/sanitary lines. Vertical clearance between mains shall be twelve (12)

inch minimum at crossings. Alignment and separation criteria for water lines and sanitation facilities shall be specified in "California Waterworks Standards," Section 64630, Title 22, California Administrative Code.

- 4.1.1.13 Permanent or temporary blow-offs shall be installed at the dead-ends of all main lines.
- 4.1.1.14 The Uniform Plumbing Code shall be used to size all commercial and multifamily meters. Standard service sizes are ¾", 1", 1½", 2", 3", 4", 6" and 8". Minimum service size for a fire service shall be 4" diameter.
- 4.1.1.15 Condos and commercial developments shall have a minimum of one meter per building.
- 4.1.1.16 Meters shall be located at back of sidewalk and are not permitted in driveways.
- 4.1.1.17 Use two (2) 45 degree bends instead of one (1) 90 degree bend whenever possible for all mainline or transmission main changes in direction.
- 4.1.1.18 Main line pipe alignment may be curved at a "radius of curvature" not to exceed the pipe manufacturer's recommendations. For tighter radiuses, use standard fittings.
- 4.1.1.19 Taps to mains shall be spaced 5 feet minimum. Parallel services shall have twelve (12) inch minimum clearance between pipes. Taps shall be twenty four (24) inch minimum from any joints.
- 4.1.1.20 Backflow prevention devices shall be installed on service connections required by City Ordinance 922 N.C. (2d). They shall be located at areas hidden from public view and/or mitigated by landscaping.

4.1.2 Calculations

- 4.1.2.1 Hydraulic calculations shall be submitted to the Water Superintendent to demonstrate that the fire flow and fire prevention requirements are satisfied. These shall include pipeline diagrams and tabulated results for easy reference.
- 4.1.2.2 The tabulated results presented shall include the maximum and minimum pressures, critical nodes water velocities, head loss inflows and outflows.

4.1.3 Plans

- 4.1.3.1 Master Plan - The proposed water system master plan for a new development shall comply with the following:

- 4.1.3.1.1 "Water System Master Plan and Hydraulic Network Analysis, City of Vallejo 1985," including latest modifications.
- 4.1.3.1.2 City of Vallejo Municipal Code Chapter 11.
- 4.1.3.1.3 City of Vallejo Standard Specifications, latest edition.
- 4.1.3.1.4 City of Vallejo Fire Department and current Fire Code regulations.
- 4.1.3.1.5 Approved Subdivision Agreement.
- 4.1.3.2 Water System Improvement Plans shall be submitted to the Water Superintendent for review and approval, and shall contain at least:
 - 4.1.3.2.1 Location and size of fire sprinkler service connection(s).
 - 4.1.3.2.2 Location and size of domestic service connection(s).
 - 4.1.3.2.3 Location and size of irrigation service connection(s).
 - 4.1.3.2.4 Location of fire hydrants.
 - 4.1.3.2.5 Location of structures with respect to existing public water system improvements, such as mains, meters, etc.
 - 4.1.3.2.6 Alignment, profile, size and material of new water mains.
 - 4.1.3.2.7 Location, size and material of any off-site water system improvements.
 - 4.1.3.2.8 Location, elevation and capacity of new reservoir.
 - 4.1.3.2.9 Location, elevation and capacity of new pump station.
 - 4.1.3.2.10 Relocation plan and details for any displaced transmission mains or other facilities.
 - 4.1.3.2.11 Location and size of air relief valves.
 - 4.1.3.2.12 Location, size and type of blow-offs.
 - 4.1.3.2.13 Location of check valve assemblies.
 - 4.1.3.2.14 Location of zone valve assemblies and indication of differing pressure zones in the utility plan.

- 4.1.3.2.15 Current City of Vallejo Water Notes and Standard Drawings as applicable.
- 4.1.3.2.16 Location, size and point of connection to existing water distribution system.
- 4.1.3.2.17 Location, size and type of mainline valves and facility isolation valves.
- 4.1.3.3 Grading Plans - shall include note requiring the installation of an elevated (Klein) tank for temporary water service from a fire hydrant.
- 4.1.3.4 Landscaping Plans - shall indicate location and size of all taps, irrigation meters and backflow devices. Drought resistant species selection is recommended for all landscaping plans.
- 4.1.3.5 Record Drawings – Record drawings are derived from the compilation of all information from marked up “red lined” construction prints, design/build subcontractor drawings, electrical wiring diagrams, manufacturer show drawings and any other pertinent job related data. The Contractor shall submit one hard copy of the Record Plan (24” x 36” reproducible ink/toner on Mylar or photo Mylar drawing) and one digital copy of the Record Plan (computer scanned at 200 dpi, in both TIF and PDF format or AutoCAD DWG format and PDF format).

4.1.4 Fees

- 4.1.4.1 Water service will be provided by the City of Vallejo upon completion of the required water system improvements and payment of applicable fees. Performance and Payment Bonds shall be provided to the City of Vallejo prior to construction of the water system improvements. Fees may include but are not limited to: fees specified in the Vallejo Municipal Code; tapping fee; tie-in fee; inspection fee; disinfection fee; construction water fee; and other fees for services provided by the City with respect to the water system improvements. The Water Superintendent should be contacted for applicable fees.

4.2 Material Standards

4.2.1 Ductile Iron Pipe (DIP)

- 4.2.1.1 All ductile iron pipe six (6) inches and greater in nominal internal diameter shall be manufactured in nominal 18 foot laying lengths and conform to ANSI/AWWA Specifications C-150, A 21.50-81, C-151, A 21.51-81 and Erratum, and unless otherwise called for by the approved plan or in the Special Provisions of the Specifications, be the thickness class hereinafter indicated for the various internal diameters:

4" diameter thickness Class 51 or better

6" through 20" diameter thickness class 50 or better

- 4.2.1.2 Ductile iron pipe shall be lined with cement mortar in accordance with the requirements of the "American National Standard for Cement Mortar Lining for Cast Iron and Ductile Iron Pipe and Fittings for Water" (ANSI A21.4 AWWA C104) except that lining thickness shall be not less than 3/16" for pipe smaller than twenty four (24) inches in diameter and 1/4" for pipe twenty four (24) inches in diameter and larger.
- 4.2.1.3 All ductile iron pipe materials furnished and/or delivered pursuant to these specifications shall be manufactured with one bell and one spigot end for push on joint assembly (Tyton type joint or approved gasket to effect the joint seal conforming to ANSI Specification A21.11-80 (AWWA C111). Not less than one (1) rubber gasket shall be furnished with each length of pipe simultaneously with the delivery of the pipe.
- 4.2.1.4 Ductile iron pipe shall be installed in accordance with the "American National Standard for Installation of Gray and Ductile Cast Iron Water Mains and Appurtenances" (ANSI/AWWA C600). Buried pipe shall be polyethylene encased in accordance with the "American National Standard for Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids" (ANSI A21.5/AWWA C105).

4.2.2 Polyvinyl Chloride Pipe (PVC)

- 4.2.2.1 PVC Treated Water Mains - All PVC pipe for treated water mains shall comply with AWWA Standard C900 Class 200 DR-14 for pipes twelve (12) inches and smaller in diameter and shall conform with AWWA Standard C905 Class 235 DR 18 for pipes fourteen (14) inches in diameter and larger.
- 4.2.2.2 PVC Raw Water Mains - All PVC pipe for use as raw water mains shall conform with AWWA Standard C900 Class 150 DR 18 for pipes twelve (12) inches and smaller in diameter and shall conform with AWWA Standard PR 165 DR 25 for pipes fourteen (14) inches in diameter and larger.
- 4.2.2.3 All PVC raw water piping shall be olive green/purple color coded for use as non potable pipe. Each pipe shall be marked on opposite sides to read "Caution Raw Water - Do Not Drink" in intervals not to exceed 5 feet. The height of the print is as follows: 2" through 24" diameter pipe - 3/8" high letters.
- 4.2.2.4 All PVC pipe shall be manufactured in nominal twenty (20) foot laying lengths with push-on joint assembly employing a single continuous rubber gasket to affect a joint seal. The wall thickness of the bell in the gasket groove and bell entry section shall be not less than that of the pipe barrel. The outside diameter of pipe barrel shall conform to that of ductile iron pipe.

4.2.2.5 No PVC pipes shall be directly connected to butterfly valves. (See section WM.05.2.5.)

4.2.3 Main Pipeline Fittings

4.2.3.1 All main pipeline fittings shall conform to ANSI Specification A21.10-82 (AWWA C110 or C153).

4.2.3.2 All fittings for ductile iron pipelines shall be ductile iron, coated on the exterior with a protective coating of standard tar varnish and lined on the interior with a bituminous seal coated cement mortar lining. All fittings shall be pressure rated at not less than 350 psi and be manufactured for Push-on joint assembly employing a single continuous rubber gasket to effect a joint seal (Tyton or Griptite), or Mechanical Joint conforming to ANSI/AWWA C111/A21.11.

4.2.3.3 All cast iron flange fittings shall be furnished with Class 125 flanges per ANSI/AWWA C115/A21.15 for use with Class 250 cast iron pipe, except on mainlines where the working pressure exceeds 150 psi.

4.2.4 Fire Hydrants

4.2.4.1 All fire hydrants shall be Clow Corp., Series Model 960; or Long Beach, CA, Model No. 615 (no substitutes) and shall be equipped with plastic caps, having two 2½" hose outlets and one 4½" hose outlet (National Standard Hose Thread), painted white, including "break-off" hydrant bolts, nuts and gaskets.

4.2.4.2 Fire hydrant buries shall be Mechanical Joint, cement lined, six holes with accessories. Fire hydrant extensions shall be machined grooved, cement lined, six holes with the following accessories: break-off check valve Clow Model LBI 400A or approved equal, one gasket and six low alloy steel bolts and nuts.

4.2.5 Valves

4.2.5.1 Gate Valves - All valves ten (10) inches in diameter and smaller shall be resilient seat gate valves conforming to AWWA C509 and C550. Valve inside diameter shall be nominal or larger.

4.2.5.1.1 Cast iron or ductile iron body with "push-on" Tyton type joints or Mechanical Joints (MJ), suitable for buried insulation. Fire hydrant valves shall be flanged x MJ.

- 4.2.5.1.2 All interior and exterior ferrous surfaces shall be lined and coated with factory applied epoxy in accordance with AWWA C550. Minimum thickness shall be 8 mils.
- 4.2.5.1.3 Bronze or stainless steel mounted resilient rubber encapsulated disc or seat.
- 4.2.5.1.4 Stationary stem with O-ring type seal two (2) inch square operator non rising stem.
- 4.2.5.1.5 Valve shall open left (counter clockwise). Approved manufacturers: Clow, U.S. Pipe, M & H, Mueller, or Kennedy (no substitutes).
- 4.2.5.2 Butterfly Valves - Valves twelve (12) inches and larger shall be butterfly valves conforming to AWWA C504 Class 150B.
 - 4.2.5.2.1 Cast iron or ductile iron body with flange type joints.
 - 4.2.5.2.2 All interior and exterior ferrous surfaces shall be lined and coated with factory applied epoxy in accordance with AWWA C550. Minimum thickness shall be 8 mils.
 - 4.2.5.2.3 Valve shafts for twenty four (24) inch diameter and larger valves shall be 316 stainless steel. Stub shafts or through shafts are acceptable. The valve shaft/disc connection shall be made through the use of on-center taper pins and lock nuts. The taper pins and lock nuts shall be of the same materials as the valve shaft. Material shall be 316 stainless steel.
 - 4.2.5.2.4 Valve shall have a two (2) inch square operating nut and shall open left (counter clockwise).
 - 4.2.5.2.5 When PVC pipes are connected with butterfly valves, a ductile iron pipe (DIP) Flange by MJ Adapter shall be installed between the PVC pipe and the butterfly valve. Approved manufacturers: Pratt "Groundhog," Mueller "Line Seal," Kennedy, and M & H (no substitutes).
- 4.2.5.3 Tapping Valves - Shall be generally the same specifications as for gate valves, except that they shall be flanged on one end with conventional Mechanical Joint on the opposite end. The valve shall be Mueller A-2370-16 or approved equivalent models of Clow, U.S. Pipe, Kennedy, or M & H. No substitutes.
- 4.2.5.4 Check Valves - All check valves not exceeding twelve (12) inches in size to be installed in main pipelines shall be iron or ductile iron body, BUNA-N rubber seat, bronze or stainless steel mating surface, equipped with outside lever and adjustable sliding weight. They shall be manufactured with flanged

ends for jointing. The check valves shall be Mueller A-2602-6-01 as manufactured by the Mueller Company of Decatur, Illinois, or APCO No. 6000 CLW as manufactured by the APCO Valve and Primer Corporation. The Check valves shall be lined and coated with a minimum of 8 mils of factory applied epoxy.

4.2.5.5 Flanged Valves - Flanged valves shall be as specified above for gate and butterfly valves except flanged valves shall be flat-faced without projections or raised face. Face shall be smooth or may have serrated finish of approximately 32 serrations per inch, approximately 1/64 inch deep.

4.2.5.6 Valve Extensions - When the top of the valve nut is greater in depth than four (4) feet from the valve box lid, an epoxy coated steel or ductile iron valve extension shall be installed that will bring the valve nut to a point two (2) feet in depth from the valve box. All valve extensions must be equipped with a "centering ring" located six (6) inches below the nut, which will place the extended valve nut in the center of the valve riser.

4.2.6 Tapping Sleeves and Accessories

4.2.6.1 Mechanical Joint type tapping sleeves shall be used for all taps into existing mains. Bolts shall be low alloy steel with heavy hex nuts. Approved MJ tapping sleeves are "Mueller #H-615/#-H616," for Cast Iron, Ductile Iron Pipe, and PVC C900 Pipe; and Mueller H-619 for Asbestos Cement Pipe or approved equal.

4.2.7 Couplings and Adapters, Mainline

4.2.7.1 Mechanical Joint solid-sleeve type couplings shall be used for all spigot to spigot pipe connections in all new main installations. Mechanical Joint (MJ) sleeves shall comply with AWWA C110 Table 10.10 or C153 Table 53.5. The pressure class shall be 350 psi. In cases of differing pipe ODs, an MJ transition sleeve shall be used. For transition couplings larger than twelve (12) inches in diameter, submit manufacturers specification data for approval.

4.2.7.2 Flange x MJ Connecting Piece - Where underground flanged connections occur, the transition from plain end pipe to a flanged connection shall be accomplished using an AWWA C110 Flange x MJ connecting piece as listed in Table 10.13. The pressure class for connecting pieces shall be 250 psi; the flange drilling pattern shall match ANSI Class 125.

4.2.7.3 Flange Coupling Adapters (FCAs) - Cast iron FCAs are permitted in manhole or vault type installations where minimal laying length dimensions are required. Acceptable manufacturers are Rockwell #912, Dresser Style #127 or Ford Style FFCA.

4.2.7.4 Repair Couplings for Existing Mains

- 4.2.7.4.1 Compression Cast Couplings - Compression cast couplings shall be Romac 501 or XR501 or approved equal, for ductile iron pipe and shall be furnished with compound rubber gaskets, 5/8" low-alloy steel bolts with no less than six (6) low-alloy steel hex head bolts and nuts for each coupling. The overall length of each coupling shall be not less than six (6) inches.
- 4.2.7.4.2 Full Circle Clamp Couplings - Full circle clamp couplings shall be Smith Blair 400 Series Steel super range double band full circle or approved equal. Each clamp shall have adequate O.D. range to repair all classes of ductile iron pipe in one nominal pipe size. Lugs shall have mutually supporting sliding fingers and shall be firmly attached to the double stainless steel bands by a coining process during the closing operations. The stainless steel armor plate shall be recessed flush into the gasket. All bolts and nuts shall be low alloy steel.
- 4.2.7.4.3 Mechanical-Type Couplings - Mechanical-type couplings shall be designed for a water working pressure not less than 150 psi and shall be equipped with Grade H rubber gaskets. All ferrous surfaces shall be fusion bonded epoxy lined and coated. Couplings shall be Gustin-Bacon or Victaulic Style 44 when pipe ends are grooved. Buried or submerged couplings shall be provided with low-alloy steel bolts and nuts.

4.2.8 Service Pipe

- 4.2.8.1 Copper Service Pipe - Copper service pipe shall be soft annealed type K with a .026 inch thick polyethylene jacket made in conformance with the following specifications:
- 4.2.8.1.1 Federal Specification W W-T799
- 4.2.8.1.2 ASTM Specification B 88-55
- 4.2.8.1.3 AWWA Specification 75-CR
- 4.2.8.1.4 All copper service pipe shall be furnished in 60 foot coils except 1½" and 2" diameter which shall be furnished in 20 foot lengths. 1½" and 2" coils shall not be permitted. Splicing of service pipe is not permitted except where the distance between the main and the meter exceeds sixty (60) feet for ¾" and 1" services, or 20 feet for 1½" and 2" diameter services.
- 4.2.8.2 Brass Service Pipe - All red brass pipe shall comply with AWWA C-800.

4.2.9 Service Fittings

- 4.2.9.1 All service fittings shall comply with the latest edition of AWWA C-800. Acceptable manufacturers are James Jones Company of El Monte, CA and Mueller Co. of Decatur, Illinois. Compression fittings are permitted on ¾", 1", 1½" and 2" diameter services.
- 4.2.9.2 Corporation Stops, ¾" and 1" shall be Corporation Stop (C.C.) for DIP and PVC mains. Shall be iron pipe thread on concrete cylinder mains.
 - 4.2.9.2.1 J. Jones: E-1937 SG or E-1935 SG (Compression) or Mueller: B-25000 8N or B-2502 8N (Compression). Inlet thread of each catalog number is C.C. Thread, or Iron Pipe Thread, respectively (no substitutes).
- 4.2.9.3 Corporation Stops, 1½" and 2" - CC thread on DIP & PVC mains shall be iron pipe thread on concrete cylinder mains.
 - 4.2.9.3.1 J. Jones: E-1937 SG or E-1935 SG (Compression) or Mueller: H-15000, B-2500 8N or B-2502 8N (Compression). Inlet thread of each catalog number is C.C. Thread, or Iron Pipe Thread, respectively (no substitutes).
- 4.2.9.4 Unions, 1½" and 2", Compression
 - 4.2.9.4.1 Unions are permitted only when the length of a 1½" or 2" service run exceeds 20 linear feet. James Jones: E-2609 SG; Mueller: H-15403N. Each catalog number is for Flare and Compression. Unions are not permitted in ¾" or 1" diameter service runs that are less than 60 linear feet.
 - 4.2.9.4.2 For service runs greater than 60 linear feet on ¾" or 1" service: James Jones E-2609 SG; Mueller H-15403N. Each catalog number refers only to Compression fittings (no substitutes).
- 4.2.9.5 Adapters
 - 4.2.9.5.1 Iron pipe thread (IPT) X Compression, James Jones: E-2605 SG; Mueller: H-15428N. No substitutes.
- 4.2.9.6 Curb Stops ¾" and 1"
 - 4.2.9.6.1 Curb stops shall be angle meter stop ball valve design with meter nut outlet and lockwing. James Jones: E-1963 WSG; Mueller: B-24258N. Each catalog number cited is for Compression (no substitutes).
- 4.2.9.7 Angle Meter Ball Valves 1½" and 2"
 - 4.2.9.7.1 Angle meter ball valves shall be angle meter stop ball valve design with lockwing, and with IPT or Compression inlet and meter flange outlet.

Those with IPT inlets are James Jones: E-4205 SG; Mueller: Compression inlets H-14277N, or approved equal.

4.2.9.8 Curb Stops Air Relief/Blow-off Assemblies

4.2.9.8.1 James Jones: E-1900W; Mueller: B-20200N (no substitutes)

4.2.10 Service Saddles

4.2.10.1 General - Bronze service saddles are required for all taps into PVC mains and for all 1½" and 2" service taps into Ductile Iron Pipe (DIP) mains. DIP mains 4" and larger may be direct tapped only for ¾" and 1" diameter services.

4.2.10.2 Double Strap Bronze Service Saddles - Shall be double strap, four bolt type. James Jones: J-979 (CC); Mueller: BR-2B Type 323 (CC), (no substitutes).

4.2.11 Valve Boxes

4.2.11.1 Valve boxes shall be reinforced concrete adjustable traffic type, Model #G5 with a machined cast iron lid and ring seat rattle proof lid without danger of lid pop off in heavy traffic, as manufactured by Christy Concrete Products, Inc., Fremont, CA; or Bes Concrete Products, Tracy, CA. Each cover shall be cast with a recessed lettering "Water" across the upper face (no substitutes).

4.2.12 Water Meter Boxes

4.2.12.1 All water meter boxes shall be of high density reinforced concrete with non-settling shoulders positioned to maintain grade and facilities backfill. Lids shall be reinforced concrete with recessed lettering "Water Meter" marked across each lid and with pit hole and 1¾" hole for reading probe, as manufactured by Christy Concrete Products, Inc., Fremont, CA; or Bes Concrete Products, Tracy, CA; or approved equal.

4.2.12.2 All water meter boxes shall be sized correspondingly with the following water meters:

<u>Meter Size</u>	<u>Water Meter Box</u>
¾"	B-9
1"	B-16
1 ½"	B-36 Fibrelite Box
2"	B-36 Fibrelite Box
4"	Christy B48 pit with lid
6" and larger	as specified by the Engineer

4.2.13 Air Release Valves

- 4.2.13.1 Combination Air Valves (CAV) shall be of the size shown and shall have flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 18-8 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance.
- 4.2.13.2 Valves shall be lined and coated with a minimum of 8 mils of factory applied epoxy. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise shown. Valves shall be the type that purges air from the system at start up, and vent small pockets of air while the system is pressurized and prevent critical vacuum conditions during draining of the system, and shall be "Standard Combination Air Valves, Bulletin #623," as manufactured by APCO Valve and Primer Corporation; or Crispin; or G.A. Industries, Inc.; or approved equal.

4.2.14 Gaskets and Bolts

- 4.2.14.1 Except as otherwise provided, gaskets for flanged joints shall be 1/16 inch thick. Asbestos gaskets shall not be permitted.
- 4.2.14.2 Except as otherwise provided, bolts shall be of low-alloy steel.

4.2.15 Polyethylene Wrap

- 4.2.15.1 All ductile iron pipe, ductile iron fittings and all bolted fittings shall be wrapped in 8 mils of polyethylene in accordance with AWWA C105. Polyethylene shall normally be supplied by the pipe manufacturer unless otherwise permitted by the Engineer.
- 4.2.15.2 Valves and fittings shall be double wrapped to 16 mil (minimum). On PVC mains, the polyethylene wrap shall extend twelve (12) inches onto the barrel of the pipe. All openings shall be securely taped. Service saddles on all pipes shall be double wrapped with polyethylene and securely taped.

4.2.16 Dielectric Fittings and Coatings for Cathodically Protected Pipelines, Valve Pits and Pump Stations

- 4.2.16.1 General - Brass, copper and stainless steel shall be kept electrically isolated from ductile iron and low alloy steel. Eliminate points of direct metallic contact through the use of insulating bushings, PVC Sch. 80 nipples, insulating couplings, or other approved insulating system. Also isolate nonferrous pipe from steel supports and pipe straps by means of insulating sleeves or dielectric tape.
- 4.2.16.2 Threaded Bushings - Shall be PVC.

4.2.17 Insulating Flanged Joints

- 4.2.17.1 Insulating flanged joints shall be provided between DIP, Steel Pipe, and Concrete Cylinder Pipe. Insulating flanged sets shall have laminated phenolic gaskets and shall be provided with laminated phenolic sleeves and washers.
- 4.2.17.2 Plain phenolic flange kits shall have 1/16" back-up gaskets on each side of the phenolic gasket to aid in sealing. Acceptable manufacturers are "CALPICO" of So. San Francisco and PSI, Pipeline Seal & Insulator Inc., of Houston, Texas.

4.2.18 Tape and Mastic

- 4.2.18.1 Tape - Materials and method of application shall comply with AWWA C209. Tape shall be 10 mil (minimum) polyvinyl tape, half lapped to provide 20 mils of coating. All miscellaneous metals shall be protected from direct contact with soil or concrete. Acceptable manufacturers: Polyken Technologies, Pacific Pipeline Products, Emeryville, CA; CALPICO Inc. of San Francisco, CA; Scotchwrap, 3M Company, St. Paul, MN.
- 4.2.18.2 Mastic Coating – No mastic coating material shall be used to coat metallic appurtenances.
- 4.2.18.3 Where metal is partially embedded in concrete (fence posts, risers, brackets, etc.) wrap pipe with tape for a minimum distance of three (3) inches into concrete and three (3) inches exposed. Acceptable manufacturers: Protecto Wrap CA1200; Polyguard CA14.

4.2.19 Backfill

- 4.2.19.1 General - Subsequent backfill material, above the pipe zone shall comply with the Standard Typical Trench Backfill (Dwg #3-19) and Section 3 of these specifications.
- 4.2.19.2 Sand - Sand backfill is required in the pipe zone of polyethylene encased DIP. Sand quality and gradation shall comply with PG&E and PacBell standards for joint trench backfill in the City of Vallejo.
- 4.2.19.3 Class II AB, ¾" - The pipe zone of all PVC pipe, copper services, valve risers, meter boxes and other pipeline appurtenances shall be backfilled with ¾" Class II Aggregate Base as specified in Section 26-1.02B in the Standard Specifications.

4.3 Construction Standards

4.3.1 General

- 4.3.1.1 Earthwork - Earthwork shall conform to Section 19 of the Standard Specifications and as supplemented herein.
- 4.3.1.2 Compaction Test - Compaction tests shall be required on all engineered fills, subgrade, subbase course, base course and trench backfill. The project soils engineer shall furnish to the City test results in written form before the Contractor will be permitted to proceed with subsequent work and only if the compaction tests meet the relative compaction requirements for the particular course under consideration.
- 4.3.1.3 Grading Over Watermains - No excavation or fill shall take place over an existing watermain which will result in a cover depth over the same main of less than two (2) feet or greater than five (5) feet unless specifically approved by the Water Superintendent.
- 4.3.1.4 Clearing and Grubbing - Attention is directed to Section 16 of the Standard Specifications and as specified herein.
- 4.3.1.5 Construction Water - Furnishing and applying water shall conform to Section 17 of the Standard Specifications as modified herein. It is the Contractor's responsibility to make arrangements for a temporary water meter for use in obtaining construction water from the City water system.

Contact: Office of the Water Superintendent (707) 648-4307

"Evasion of payment for water; tapping or injuring pipes or meters is a misdemeanor and is punishable by fine or jail or both." (Section 499, California Penal Code, 1970 Supplement)

- 4.3.1.6 Dust Control - Attention is directed to Section 18 of the Standard Specifications as modified herein, and to Section 2.5.7. of these Specifications concerning dust control.
- 4.3.1.7 Hours of Work - (See Section 1.1.10 of these specifications)
- 4.3.1.8 Traffic Control
 - 4.3.1.8.1 General - Traffic control shall meet the requirements of State of California Department of Transportation Manual of Traffic Controls for Construction and Maintenance Work Zones, 1985 and Work Area Traffic Control Handbook.

- 4.3.1.8.2 Traffic Control Plan - Three weeks prior to excavation, the Contractor shall submit for approval, a detailed traffic control plan to the City Traffic Engineer. The plan shall identify locations and types of devices, dates and times of work, and other pertinent data as required by the Water Superintendent.
- 4.3.1.8.3 Posting and Notification - The Contractor shall post the construction area at least one week prior to the start of construction, advising the public of the work to be done. The Contractor shall notify the adjacent private property owners and/or lessees of the construction work area, at least 48 hours prior to beginning work in that area. These notices shall describe the nature of the work, the traffic control measures and anticipated driveway closures, and the approximate duration of the work in that area.
- 4.3.1.8.4 Lane Restrictions - The Contractor may restrict traffic to one (1) 12-foot traffic lane between 8:30 a.m. and 4:00 p.m. during work days. At all other times, the two (2) existing traffic lanes shall be open for traffic throughout the work area. Whenever the traveled way is reduced to one lane or when equipment is impeding or crossing a lane of traffic, the following conditions shall be met:
- 4.3.1.8.4.1 Proper traffic control shall be in effect at all times as described in the State of California Division of Highways pamphlet, Instructions for Flagmen.
- 4.3.1.8.4.2 There shall be two (2) full-time flagpersons, one at each end of the work area. Each flagperson shall be equipped with a red vest, "STOP/SLOW" paddle and a red flag. In addition, portable radio communication shall be used as directed by the Engineer.
- 4.3.1.8.4.3 *Signs warning motorists of the upcoming obstructions shall be placed an adequate distance ahead of the work area. Proper coning shall be maintained to direct traffic safely.
- 4.3.1.8.4.4 *Failure to comply with the above rules or to maintain traffic control in a safe manner shall be cause for the immediate shutdown of the work.
- *To be in effect at all times.
- 4.3.1.8.4.5 The Contractor shall furnish all necessary flagpersons and traffic control equipment in the areas where work is being performed and routing and directing of traffic is required.
- 4.3.1.8.4.6 All excavations within the vehicular travel way shall be backfilled and temporary pavement installed by 4:00 p.m. The Contractor shall take necessary precautions for pedestrian traffic.

- 4.3.1.8.5 Temporary Surfacing - All temporary surfacing shall conform to existing pavement elevation within one half ($\frac{1}{2}$) inch plus or minus. Prior to final paving, the Contractor shall maintain temporary paving surfaces to insure safe, convenient travel by users of the roadway. Temporary paving shall be patched on a daily basis as directed by the Engineer.
- 4.3.1.8.6 Barricades and Lights - To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, yellow lanterns and guards shall be placed and maintained during the progress of the construction work and until it is safe for pedestrian and vehicle traffic. All materials, piles, equipment and pipe which may serve as an obstruction to traffic shall be protected by the placing and maintaining of proper barricades and lights when the visibility is poor.

4.3.2 Inspection and Submittals

- 4.3.2.1 Inspection - All work and material (including the manufacture and preparation of such material) from the beginning of the construction until final completion and acceptance of the proposed work, shall be subject to the inspection and approval of the Engineer.
 - 4.3.2.1.1 Unless otherwise authorized, work shall be done only in the presence of the Engineer. Any work done without proper inspection shall be subject to rejection. The Engineer shall at all times have access to the work during its construction or fabrication at shops and yards as well as the project site.
 - 4.3.2.1.2 Any work or material found to be in any way unsatisfactory or defective before the acceptance of the proposed work shall be corrected or replaced immediately by the Contractor at his own expense, regardless of the fact that it may have been previously overlooked or passed by the Engineer. Inspection of the work shall not relieve the Contractor of the obligation to fulfill all conditions of the contract.
 - 4.3.2.1.3 Whenever required by the Engineer, the Contractor shall furnish all labor, material, tools and equipment necessary to make an examination of any work under the contract that may be completed or in progress, even to the extent of uncovering or taking down portions of the previously inspected, finished work.
- 4.3.2.2 Submittals - Contractor shall submit seven (7) copies of shop drawings, valves, fittings, coatings, couplings, service saddles and all other pipeline, pump station and reservoir materials. Unless said methods and materials have been previously accepted in the appropriate section of these specifications.

- 4.3.2.2.1 Make all submittals far enough in advance of scheduled dates of installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.
- 4.3.2.2.2 Allow thirty (30) working days for Engineer's review plus transit time.
- 4.3.2.2.3 Guidelines for submittal processing are available on request. The Contractor shall deliver to the Engineer one complete set of Final Record Drawings (both hard copy and digital). Final acceptance of project shall not occur until after Record Drawings have been submitted and accepted. (See section 4.03.E.)

4.3.3 Existing Facilities

- 4.3.3.1 General - Attention is directed to Section 15 of the Standard Specifications as supplemented herein.
- 4.3.3.2 Underground Service Alert - The Contractor shall contact U.S.A. (800) 642-2444 to request surface marking of all underground utilities. The Engineer shall field mark a final pipeline alignment based on potholing information developed by the Contractor and on the surface markings of adjacent and crossing utilities. No final alignment decisions shall be made until all utilities have been marked and potholed to the Engineer's satisfaction.
- 4.3.3.3 Potholing Existing Facilities - When connections are to be made to any existing pipe or other appurtenances the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate and expose the existing facility before trenching for laying pipe. The existing facility shall be inspected before the connection is made. As directed by the Engineer, the Contractor shall also pothole along the proposed alignment of the new waterline the locations of adjacent and probable conflict with utilities prior to final construction staking.
- 4.3.3.4 Repair of VSFCD Facilities - The Vallejo Sanitation and Flood Control District is responsible for the maintenance of all sewer mains in Vallejo including sewer laterals with cleanouts. Any storm drain facility broken or damaged by the Contractor shall be repaired by the Contractor to District standards. The Contractor shall promptly notify Vallejo Sanitation and Flood Control District concerning damaged facilities. All costs for repairing broken storm drain facilities to District standards including materials and labor shall be Contractor's responsibility.
- 4.3.3.5 Repair of Other Utilities - In the event of damage to other utilities, the Contractor shall notify the owner of the facility to arrange for the necessary

shut-down and repairs. The Contractor shall not proceed with further trench work until arrangements for repair have been made and the affected utility has declared that the situation is safe for further work.

- 4.3.3.6 Asphalt Pavement - Before constructing pavement restorations the edges of the existing pavement shall be sawcut to lines outside the disturbed or damaged pavement and all shattered, broken or loose material removed from the site. The thickness of the pavement base course to be reconstructed shall be the thickness of the existing base plus one (1) inch and compacted to 95% relative density by mechanical methods. The type and thickness of surfacing to be reconstructed shall be the type and thickness of that which is existing. (See Section 3.3.1 for further requirements.)
- 4.3.3.7 Gutters, Sidewalks, Curbs, Etc. - Existing concrete pavement, curbs, gutters, sidewalks or driveways shall be removed by saw cut. If a saw cut in pavement falls within three (3) feet of a construction joint, cold joint, expansion joint or edge, the concrete shall be removed and replaced to the joint or edge. Saw cuts and removal of sidewalks, curbs, gutters and driveways shall conform to Section 3.3.37 of these Specifications.

4.3.4 Trench Excavation

- 4.3.4.1 General - Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water necessary to construct the work as shown. Unless otherwise indicated on the drawings or permitted by the Engineer excavation for sewers shall be open cut. Trenching machines may be used, except where their use will result in damage to existing facilities.
 - 4.3.4.1.1 The trenching or excavation operations shall not extend more than two hundred fifty (250) feet in advance of the pipe installation operations. In existing streets all open trenches shall be backfilled and capped, with temporary pavement, by the end of the day. Trench plates are not permitted except with written permission from the City Engineer.
 - 4.3.4.1.2 No watermain shall be installed in the same trench with any other utilities without special written permission to do so, signed by the Engineer.
 - 4.3.4.1.3 In any event, all weeds, shrubbery and other dense vegetation shall be removed from the line of the work prior to beginning of any trenching operations.
 - 4.3.4.1.4 Where any trenching operation is to be done through existing pavement, the side lines of the trench shall be sawcut through the existing pavement to neat lines leaving no loosened paving or ragged edges.

- 4.3.4.1.5 The trench shall be sufficiently braced and supported that the workmen may work therein safely and efficiently.
- 4.3.4.1.6 It is essential that the discharge of the trench de-watering pumps be conducted to natural drainage channels, drains or sewers.
- 4.3.4.1.7 The trench shall be so excavated that the pipe can be laid to the alignment and depth required.
- 4.3.4.1.8 No trenching shall be done until the line stakes have been set to control the work, and similarly grade stakes where necessary.
- 4.3.4.1.9 The Contractor shall exercise due caution to minimize breakage of existing sewers and water laterals (services) and shall repair and replace to the satisfaction of the Engineer any such service damages.
- 4.3.4.2 Line and Grade Stakes - Line and grade stakes conforming with the Plans and Profiles will be set by the Engineer on an offset line parallel to each main or other structure at convenient spacing. Prior to commencing work by the Contractor, the project engineer shall furnish to the Inspector a cut sheet giving the layout and the elevation of the work with respect to said line and grade stakes. These stakes and marks shall be carefully maintained by the Contractor in place until that portion of the work and improvement for which said stakes and marks were set has been completed, inspected and approved by the Inspector and if disturbed, shall be replaced by the Contractor's Engineer. All work shall conform to the cut sheet or revision thereof furnished to the Inspector.
- 4.3.4.3 Width of Trench - The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as hereinafter specified. Trenches shall be of such extra width when required, as shall permit the proper placing of timber supports, sheeting and bracing, and handling of pipe, fittings, etc.
 - 4.3.4.3.1 The minimum width of the trench shall be equal to the outside diameter of the pipe plus twelve (12) inches for pipe over eight (8) inches in nominal diameter, and not less than eighteen (18) inches in width for pipe eight (8) inches in nominal diameter or less.
 - 4.3.4.3.2 The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus sixteen (16) inches, and such maximum width shall be inclusive of all trench supports and bracings.
 - 4.3.4.3.3 The trench shall be braced and drained so that the workmen may work safely and efficiently therein.

- 4.3.4.3.4 The discharge of the trench de-watering pumps shall be conducted to natural drainage channels, drains or sewers and provided with erosion and sediment control devices.
- 4.3.4.3.5 If, for any reason, the width of trench measured at the top of the pipe (inclusive of any timbering or other trench supports) is excavated to a width greater than the designed width as shown on the Plans or in the Specifications, and if the design load on the pipe will be exceeded, one of the following shall control:
 - 4.3.4.3.5.1 Shape bottom of trench to increase pipe support.
 - 4.3.4.3.5.2 Combination of bedding and partial concrete encasement to increase pipe support.
 - 4.3.4.3.5.3 Complete concrete encasement to increase pipe support. In no case shall the design load on the pipe be exceeded. Where concrete encasement is used the concrete shall contain at least 376 pounds of cement per cubic yard and have a slump not to exceed four (4) inches.
- 4.3.4.4 Excavation to Grade - The Contractor shall make the required excavations for the construction of the watermain in an open trench except where tunneling may be necessary to pass obstacles and specially permitted by the Engineer.
 - 4.3.4.4.1 The trench shall be excavated to the depth required six inches below the pipe to provide for pipe bedding, except that it shall be permissible to disturb and otherwise damage the bedding material over a maximum length of eighteen (18) inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle, for ductile iron pipe only.
 - 4.3.4.4.2 Any part of the bottom of the trench excavated to a grade which shall result in an excessive vertical deflection angle at any pipe joint shall be refilled to the proper grade with Class II aggregate base thoroughly compacted as directed by the Engineer.
 - 4.3.4.4.3 The finished pipe subgrade shall be prepared accurately by means of hand tools to such elevation that beneath the centerline of the pipe the bed shall be within 0.03 feet of a straight line between pipe joints.
 - 4.3.4.4.4 The minimum cover from top of pipe to finished grade shall be forty two (42) inches. The minimum depth of cover is subject to changes which may become necessary as conditions develop in the field.

- 4.3.4.4.5 All existing utilities shall be protected and repaired to the satisfaction of the Engineer.
- 4.3.4.5 Subgrade in Poor Soil - Where soft or yielding material or other detrimental condition is encountered at the bottom of any trench or excavation which, in the opinion of the Engineer, shall not provide a satisfactory or firm bearing for the pipe, such materials shall be removed for the full width of the trench or excavation until firm material is reached. The space so excavated shall then be refilled with Class II aggregate base thoroughly compacted in layers six (6) inches thick after compaction with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell and coupling holes. For polyethylene encased DIP a six (6) inch thick layer of sand shall be placed between the Class II AB and the pipe.
- 4.3.4.6 Subgrade in Rock - Where ledge rock, boulders or large stones are encountered at the bottom of any trench or excavation, such material shall be removed to provide a clearance of at least six (6) inches below and on each side of all pipe, valves and fittings refilled with Class II aggregate base thoroughly compacted with mechanical tampers so as to provide a uniform and continuous bearing and support for the pipe at every point between bell or coupling holes.
- 4.3.4.7 Bell Holes - Bell holes shall be excavated across the bottom of the trench at pipe joint locations. They shall be of such size that the process of making joints and inspection can be carried on satisfactorily and so that the pipe barrel shall bear evenly on the bottom of the trench. Bell holes shall be so excavated that the bell of the pipe shall not support the weight of the pipe. The use of blocks to support the pipe shall not be permitted except when expressly agreed to by the Engineer.
- 4.3.4.8 Coupling Holes - Coupling holes shall be so excavated that the coupling shall not support the weight of the pipe. The use of blocks to support the pipe shall not be permitted.
- 4.3.4.9 Blasting - Blasting shall be permitted after the Contractor has received the expressed permission of the Council of the City of Vallejo and the need for such blasting has been approved by the Engineer.
- 4.3.4.9.1 No blasting shall be done except by licensed operators under the direction of a competent foreman whose credentials have been submitted to and approved by the Director of Public Works.
- 4.3.4.9.2 All explosives shall be stored, handled and used in accordance with the provisions of Division XI of the Health and Safety Code, Chapter 60, Statutes of 1939, as amended, and in compliance with any and all State and local laws and ordinances applicable thereto.

- 4.3.4.9.3 Damages or injuries resulting to persons or property resulting from the use, storage or handling of explosives shall be the liability of the Contractor. The City of Vallejo, its officers and representatives are hereby relieved of any liability connected therewith.
- 4.3.4.10 Bracing and Shoring Plan - All trenches and excavations shall be adequately braced, shored and sheeted in a manner to conform with the rules of the California Industrial Accident Commission. Any damage resulting from the lack of adequate bracing, shoring or sheeting shall be the responsibility of the Contractor.
 - 4.3.4.10.1 Prior to excavation of any trench 5 feet or more in depth, the Contractor shall submit to the City a detail plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. If the plan varies from the standard shoring systems indicated in the State Division of Industrial Safety, CAL/OSHA Construction Safety Order, the plan shall be prepared by a registered civil or structural engineer. No excavation shall start until the Engineer has accepted the plan and the Contractor has furnished the Engineer with a copy of the CAL/OSHA permit pertaining to the work. In addition, no excavation shall be allowed until the Contractor furnishes the Engineer with a copy of the project notification forms or (letters) he has forwarded to the CAL/OSHA District Office.
 - 4.3.4.10.2 The required trench widths are to be maintained clear inside all supports.
 - 4.3.4.10.3 All of said bracing, shoring and sheeting shall be removed in advance of the backfilling operation in such a manner as shall insure the adequate protection of the completed watermain, street surfaces or existing structures.
- 4.3.4.11 Disposal of Excavated Materials - The materials excavated from the trench shall be so placed as to offer minimum obstruction to traffic. Gutters shall be kept clear or other provisions shall be made for handling street or road drainage.
 - 4.3.4.11.1 All materials from trench excavations shall become property of the Contractor and shall be removed from the site and disposed off in accordance with Section 2 of these specifications.
 - 4.3.4.11.2 No materials shall be dumped on private or public property without securing the proper permits from the appropriate authority. Copies of said approved permits shall be provided to the Engineer.

- 4.3.4.11.3 All excess material shall likewise be disposed of in a manner acceptable to the Engineer and in accordance with Section 2 of these specifications.
- 4.3.4.12 Hazardous Waste in Excavation - If the Contractor encounters material in excavation which he has reason to believe may be hazardous waste as defined by Section 25117 of the Health and Safety Code, he shall immediately so notify the Engineer in writing. Excavation in the immediate area of the suspected hazardous material shall be suspended until the Engineer authorizes it to be resumed. If such suspension delays the current controlling operation, the Contractor shall be granted an extension of time as provided in section 8-1.07, "Liquidated Damages," of the Standard Specifications.
 - 4.3.4.12.1 If such suspension delays the current controlling operation by more than 2 working days, the delay shall be considered a right of way delay and the Contractor shall be compensated for such delay as provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.
 - 4.3.4.12.2 The City reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing the hazardous material from such area.

4.3.5 Bedding and Backfill

- 4.3.5.1 Bedding - Bedding shall be defined as that material under the pipe providing firm and continuous support to the pipe couplings.
 - 4.3.5.1.1 Except where concrete or clean natural sand is specified, bedding material supporting the pipe or conduit shall be Class II AB as specified in these specifications.
 - 4.3.5.1.2 When construction takes place in a dry trench and above the ground water table, a minimum of six (6) inches of Class II AB bedding shall be provided below the pipe. Bedding shall be compacted to 90% and tested before laying the pipe.
 - 4.3.5.1.3 All DIP mains and DIP fittings shall be bedded and backfilled with clean sand to twelve (12) inches above the top of the pipe. Sand quality and gradation shall conform to PG&E and PacBell standards for joint trench.
- 4.3.5.2 Initial Backfill - Initial backfill shall be defined as that material surrounding the pipe and to twelve (12) inches above the top of the pipe. Except for DIP mains, all pipes including service pipes, blow-off pipes and other appurtenances shall be backfilled to a minimum of twelve (12) inches over the top of the pipe with Class II AB.

DIP mains shall be backfilled with sand within the pipe zone

- 4.3.5.3 Subsequent Backfill - Subsequent backfill shall be de-fined as that material above the initial backfill. Subsequent backfill shall be Class II AB in existing streets or roadways and may be native material in unimproved areas. See standard trench detail and Section 3.3.5.5 in these specifications for details.
- 4.3.5.4 Compaction Methods
 - 4.3.5.4.1 General - (See Section 3.3.5.6 for compaction requirements)
 - 4.3.5.4.2 Sand - Compact by simultaneously vibrating and saturating with water. Plate type vibrators or immersion type are permitted. Saturate sand to near flooded conditions, provide sumps as necessary to pump out excess water. Generally sumps are required at all low points in the pipeline profile.
 - 4.3.5.4.3 Temporary Paving - Cutback or other temporary paving material approved by the Engineer shall be placed and compacted by mechanical methods on a daily basis to protect the base prior to final paving. Wheel rolling shall not be allowed. The Contractor shall install cutback so as to conform to existing pavement elevation within plus or minus one half ($\frac{1}{2}$) inch. Temporary paving shall be patched on a daily basis as directed by the Engineer.
 - 4.3.5.4.4 Testing - In general compaction tests are required at intervals not to exceed two hundred (200) linear feet or at a minimum of two locations, if pipe length is less than two hundred (200) feet. Compaction tests are required at all tie-in and hot-tap locations. A compaction test shall consist of individual tests of each lift of backfill material including the initial lift over the pipe.

4.3.6 Installation of Water Pipe and Appurtenances

- 4.3.6.1 Handling of Materials - All handling and hauling of the pipe, fittings, valves, hydrants and accessories shall be done with care and said material shall be lowered into the trench piece by piece by means of a derrick or other suitable equipment in such a manner as to prevent damage to said materials, the protective coatings and/or linings. Any damage to said material shall be repaired or the material replaced at the expense of the Contractor. Under no circumstances shall said materials be dropped or dumped into the trench.
- 4.3.6.2 Inspection for Defects - The Contractor shall inspect the pipe, fittings, etc., for defects. All valves shall be operated through one open and closing cycle before installation in the pipeline. Any valve displaying defective operating characteristics shall not be installed.

- 4.3.6.3 Cleaning Pipe and Fittings - The outside of the spigots and the inside of the bells on all pipe and fittings shall be wire brushed or wiped clean and free of coating materials, oil, grease, mud and/or foreign matter before the pipe is laid.
- 4.3.6.4 Laying Pipe - Every precaution shall be taken to prevent foreign matter from entering the pipe and fittings while they are placed in the line.
 - 4.3.6.4.1 At all times when the pipe laying is not actively in progress, the open end of the pipe already laid shall be closed by a water-tight plug or cap.
 - 4.3.6.4.2 After placing a length of pipe in the trench, the spigot end shall be centered in the bell after placing the rubber ring by forcing the spigot home against the bell shoulder. No "bumping home" of the pipe shall be allowed.
 - 4.3.6.4.3 Pipe deflections at bell & spigot joints shall not exceed manufacturer's recommendations and shall not result in "metal to metal" contact where any portion of the bell is in direct contact with the spigot end of the pipe.
- 4.3.6.5 Corrosion Protection for Ductile Iron - All ductile iron pipes shall be encased with a loose tube or sleeve of poly-ethylene of 8 mils minimum thickness in accordance with the latest edition of AWWA C105.
 - 4.3.6.5.1 All ductile iron fittings and valves shall be double wrapped with polyethylene (minimum 16 mils thickness) securely taped in place covering the entire exterior metal, except under stem and operating nut of valves and shall extend along the axis of the pipe for not less than one foot beyond the face of the joint, all so done as to insulate the metal from any direct contact with backfill material.
 - 4.3.6.5.2 Installation of Polyethylene Wrap
 - 4.3.6.5.2.1 Cut polyethylene tube approximately two (2) feet longer than pipe section.
 - 4.3.6.5.2.2 Center tube on pipe section, bunching up ends to expose bell and spigot.
 - 4.3.6.5.2.3 Excavate bell hole to accommodate double overlapping of polytube sections. Both ends of polytube shall be independently secured with 2" wide, 10 mil, and vinyl tape. Tape shall securely cover all openings in the polyethylene barrier.

- 4.3.6.5.2.4 Take up slack along the barrel of the pipe by loosely folding over excess tubing and spot securing with short pieces of tape.
- 4.3.6.5.2.5 Valves, fittings, and other odd shaped pieces shall be double wrapped to provide 16 mils of protection. Double wrapping shall extend twelve (12) inches beyond the ends of the fitting. Sharp edges shall be taped prior to installation of polywrap to prevent puncturing. Polywrap shall completely cover the valve to just below the operating nut where it shall be secured with three (3) wraps of tape.
- 4.3.6.5.2.6 Openings for ¾" and 1" services and air relief assemblies shall be made by making a twelve (12) inch long x-shaped cut in the polywrap.
- 4.3.6.6 Tracer Wire, Locator Tape - All pipe, including DIP, shall have a tracer wire (No. 10 solid copper with TW or THHN insulation) laid on the trench bottom centered under the pipe. A contact lead shall be provided inside the valve pot. Each valve pot shall also have a bare #10 ground lead which shall be continuous from a coil placed under the valve bedding, and in direct contact with the subgrade, to inside the valve pot. At intervals not to exceed 500 linear feet, a contact lead shall connect the tracer wire to a "short-side" service line.
 - 4.3.6.6.1 All wire connections shall be made with copper crimps encased by PT-S5 sealer (or approved equal) and snap tite caps (or approved equal). Epoxy type sealers or electricians tape and wire nuts will not be allowed for wire connections.
 - 4.3.6.6.2 All pipes shall also have a three (3) inch wide non-detectable blue plastic tape labeled "Waterline Below" laid twelve (12) inches above the top of the pipe.
- 4.3.6.7 Operation of Existing Valves
 - 4.3.6.7.1 No valves, fire hydrants, or corporation stops in any portion of the subject water distribution system previously accepted and/or in use by the City of Vallejo or in any other City watermain shall be operated by anyone other than authorized City employees.
 - 4.3.6.7.2 Where installation of the new watermains requires the operation of existing valves, fire hydrants, or corporation stops, the Contractor shall notify the Engineer two working days in advance of such needs in order that notice of shutdown may be given to consumers affected and/or other necessary arrangements made by Water Maintenance. In no event shall any shutdown be allowed where the same shall deprive the consumers of water in excess of eight hours during any one day unless a temporary or

bypass pipeline, satisfactory to the Engineer, has been installed by the Contractor.

- 4.3.6.8 Setting Fire Hydrants - Fire hydrants of the type and number called for by the Plans shall be installed as shown on the Plans or as directed by the Engineer. Hydrants shall be installed so that the center of the hydrant is one (1) foot four (4) inches behind the back of sidewalk or "face of curb." No portion of the hydrant shall extend within 6 inches of the back of sidewalk or "face of curb." Fire hydrants shall not be located further than 10 feet behind face-of-curb.
 - 4.3.6.8.1 All hydrants when installed shall stand plumb and the face of the flange at the bottom of the hydrant barrel shall be two (2) inches above the established sidewalk or ground surface grade. Hydrants shall be set so that the 4½" pumper nozzle faces the curb and each of the two 2½" nozzles face the curb at an angle of 45 degrees.
 - 4.3.6.8.2 Each hydrant shall be connected to the watermain with a six (6) inch pipe branch line and controlled by an independent six (6) inch gate valve, except when otherwise called for or directed.
 - 4.3.6.8.3 Each hydrant shall be covered with a burlap bag until it is activated following permanent connection of mainline piping to the existing system. The Contractor shall protect fire hydrants whenever the Engineer determines that the situation warrants such protection.
- 4.3.6.9 Setting Valves
 - 4.3.6.9.1 General - Immediately before installation, each valve shall be operated through one complete open/close cycle and shall be visually checked for proper operation and seating.
 - 4.3.6.9.2 Butterfly operating nuts shall be located between the center-line of the street and the centerline of the main. In unimproved areas the operating nut shall be on the north or east side of the main.
 - 4.3.6.9.3 Valve Risers and Boxes - A valve box and eight (8) inch diameter riser shall be installed plumb and directly over the center of the valves operating nut. Risers and boxes shall be set so that no shock or stress can be transmitted to the valve by construction equipment or street traffic. Riser material may be eight (8) inch diameter PVC or G-5 concrete extensions.
 - 4.3.6.9.3.1 Boxing of valves and installation of pipeline appurtenances shall begin immediately after pipe sections containing or adjacent to such appurtenance have been installed. All valve boxes, concrete collars,

paving rings, and lids shall be brought to grade after pavement has been constructed.

- 4.3.6.9.3.2 Before a new main is tied in to the existing water system, all valve boxes shall be exposed and all risers shall be cleaned. In new subdivisions, a 2" x 4" marker stake or painted reference point shall identify all valve locations. Stakes shall be located behind back of sidewalk and shall be painted blue, with black numbers indicating distance to valve.
- 4.3.6.9.4 Valve Extensions - When the top of the valve nut is greater in depth than four (4) feet from the valve box lid, an epoxy coated steel or ductile iron valve extension shall be installed that will bring the valve nut to a point two (2) feet in depth from the valve box. All valve extensions must be equipped with a "centering ring" located twelve (12) inches below the nut which will place the extended valve nut in the center of the valve riser.
- 4.3.6.10 Combination Air Valve (CAV) Assemblies - Shall be installed at all high points in the pipeline profile as shown on the approved drawings and as may be required by the engineer in the field. 6" through 14" diameter mainlines shall have at least one (1) inch diameter air relief assemblies, 16" through 20" shall have two (2) inch diameter CAVs, 24" and larger shall have four (4) inch diameter ARVs. Larger CAVs maybe specified by the Engineer if conditions warrant.
- 4.3.6.11 Services - All new services shall be a minimum of $\frac{3}{4}$ " diameter unless otherwise specified. All $\frac{3}{4}$ " through 2" diameter services shall be type K copper. After 2" diameter the next service size shall be 4" diameter. There shall not be any $\frac{1}{2}$ ", $1\frac{1}{4}$ ", $2\frac{1}{2}$ " or 3" diameter services permitted. Splicing of service pipe is not permitted except when the length of the service run exceeds 20 LF for $1\frac{1}{2}$ " and 2" services or 60 LF for $\frac{3}{4}$ " and 1" services. In general the sequence of construction shall be as follows:
- 4.3.6.11.1 Pressure Test - New services shall be tested at the same time as the mainline. The test shall be held against a closed curb stop which shall be located approximately two (2) feet above finish grade.
- 4.3.6.11.2 Lowering to Grade - After the sidewalk is poured and the roadway is complete, the Contractor shall lower the curb stop and install the meter box. The centerline of the curb stop shall be lowered to twelve (12) inches below finish grade and to twelve (12) inches behind the back of sidewalk. The meter box shall be set and the utility pad poured.
- 4.3.6.12 Permanent Blow-offs - Shall be installed at the end of all mainlines which will not be extended at a future date. Permanent blow-offs shall be 2" diameter for all mainlines. Permanent blow-offs shall be constructed as shown in the

standard drawings and shall have thrust blocks poured to restrain the cap or plug.

- 4.3.6.13 Temporary Blow-offs - Shall be identical to permanent blow-offs except the cap shall be restrained with a reverse anchor to permit future extension of the main. For mains that are 12" in diameter or less, all restraint shall be developed by the reverse anchor. For mains 14" and larger, the cap shall be restrained with a combination of 12" diameter reverse anchor and a thrust block sized to resist the remaining thrust.
- 4.3.6.14 Test/Sampling Blow-off - Shall be installed at the ends of all new mains at a location approximately 6' to 10' away from the point of connection to the existing system. When a new main is to be "hot-tapped" into an existing main, the "point-of-connection" to the existing system shall be defined as the down-stream side of the tapping valve. These blow-offs shall be used for pressure testing, flushing, and for taking bacteria samples. After passing the disinfection test, and within 30 days maximum, the test/sampling blow-off shall be removed and the line shall be "tied-in." If the line is not "tied-in" within thirty (30) days, then a new disinfection test shall be performed at additional expense to the Contractor. Design of thrust restraint for a sampling/test blow-off shall be at the Contractor's option. For mains larger than 12" diameter, the design details for thrust restraint shall be submitted to the Water Superintendent for approval.
- 4.3.6.15 Concrete Anchors and Thrust Blocks - Plain and reinforced concrete anchors for the watermain shall be constructed at the locations shown and as called for on the Plans. The anchors shall be constructed so as to obtain a full bearing, opposed to axial and lateral thrusts, against solid undisturbed material.
 - 4.3.6.15.1 Ground and forms against which concrete is to be placed shall be moistened before placing the concrete. Forms shall be smooth, mortar tight and of sufficient strength to maintain shape during the placing of the concrete. All concrete shall be rodded and spaded to insure smooth surfaces and to eliminate rock pockets.
 - 4.3.6.15.2 Forms for anchors shall be removed to a depth of at least two (2) feet below the established street or ground surface grade before any backfill material is placed.
 - 4.3.6.15.3 Steel reinforcement bars, if required, shall be cleaned of all loose mill and rust scale, mortar, oil, dirt or other foreign substances; shall be bent to the prescribed dimensions and shall be placed accurately to the dimensions shown on the drawings.

- 4.3.6.15.4 Where bars are spliced, they shall be lapped thirty bar diameters. All reinforcing bars shall be fully encased in concrete or mortar. Minimum cover shall be three (3) inches.
- 4.3.6.16 Special Provisions for Concrete Cylinder Pipe - After laying the pipe in the trench to true alignment and grade, the exterior joint cavity shall be completely filled with Portland cement grout in an approved manner. After completion of exterior joint, the trench shall be backfilled immediately in vicinity of and around the joint to prevent shrinkage cracks. The backfilling shall be sufficiently moist or, if for any reason immediate backfilling with moist earth is undesirable, the joint shall be kept moist and protected from open air for a period of not less than seven (7) days. The grout shall be poured in such a manner that all exposed portions of the metal joint sleeve shall be completely protected with cement mortar. Grout shall be mixed in proportions of one part Portland cement to two parts sand. Steel wedges or spacers shall be placed in the interior annular space between the pipes, if necessary, to insure a sufficient space for bonding of inside joint and removed before jointing with mortar.
- 4.3.6.16.1 The inside joint shall then be filled with mortar of stiff consistency and troweled to a smooth surface. Completion of the inside joints shall take place after the trench has been backfilled and the initial settlement of the line is complete. An approved curing compound shall be applied to the completed inside joints
- 4.3.6.16.2 Where concrete cylinder pipe or reinforced concrete pipe is jacked under railroads or highway crossings, the pipe shall be assembled outside the casing at the line and grade of the casing. A poured bituminous joint equal to Pioneer Flintkote Company's "Flintseal" shall be used instead of grout to fill the outside annular space between pipe sections, and sufficient material poured to completely cover all exposed portions of the metal joint sleeves. Steel wedges or spacers which are locked into proper position shall be placed in the interior annular space between the pipe to insure proper spacing of pipes while jacked into position. After pipes are in final position the spacers shall be recovered. The inside joints shall be completed as specified above.

4.3.7 Filling and Pressure Testing

- 4.3.7.1 General - The new pipeline shall have a two (2) inch blow-off in-stalled at each end of the pipe and at any additional locations required by the Engineer.
- 4.3.7.1.1 The Contractor shall furnish all materials, tools and equipment necessary to conduct proper tests as hereinafter specified. Gauges and water meters for the tests shall be supplied by the City.

- 4.3.7.1.2 Contractor shall furnish and install an approved backflow device between the water source and the pipeline to be filled.
- 4.3.7.1.3 The pipe shall be filled with water from the City Water System, taking care to see that all air vents are open during the filling. After filling, the pipeline shall stand full for not less than twenty-four hours to allow the escape or absorption of slight air pockets.
- 4.3.7.1.4 During this period of time all pipe valves connecting fittings and temporary plugs shall be examined for leaks. If any leaks are found, they shall be repaired.
- 4.3.7.1.5 In making the test of any particular section, temporary watertight plugs shall be installed at end of pipe. The completely closed pipeline section shall be subjected then to an internal hydrostatic pressure test of 175 psi for a period of not less than four hours and all repetitions of this test shall be for a similar period of time, and at the same pressure.
- 4.3.7.1.6 The test pump shall be tested by the Engineer before it is used on the pipeline and found satisfactory to him. The pump shall be of a type which will measure accurately the quantity of water pumped into the pipeline while under test or a standard water meter furnished by the City may be used.
- 4.3.7.1.7 All cracked pipe, special castings, fittings, valves, loose joints and/or leaky joints shall be repaired or removed and re-placed with sound work and the test repeated in sequence until satisfactory pipe tightness has been obtained.
- 4.3.7.1.8 No section of pipe shall be considered acceptable for further backfilling or paving until the leakage from the line does not exceed the allowable leakage specified in the following section.
- 4.3.7.2 Allowable Leakage DIP and PVC Mains - The allowable leakage for "push-on" rubber gasketed joints shall be as described in AWWA C-600, Section 4, except the test pressure shall not be less than 175 psi at the highest point in the pipeline and not less than 4 hours:

$$L = \frac{SD \sqrt{175 \text{ psi}}}{33,200}$$

Where:

- L = Allowable leakage, in gallons per hour
- S = Length of pipe tested, in feet
- D = Nominal diameter of the pipe, in inches

- 4.3.7.3 Allowable Leakage Concrete Cylinder Pipe

- 4.3.7.3.1 Test Pressure: Shall be one and a half (1½) times the operating pressure at the lowest elevation of the pipeline, but not less than 150 psi.
- 4.3.7.3.2 Leakage: Rubber gasket joints shall not exceed five (5) gallons per inch diameter per twenty four (24) hours per mile of pipe.
- 4.3.7.3.3 Leakage: Welded or flanged joints shall not exceed one and a half (1½) gallons per inch diameter per twenty four (24) hours per mile of pipe.

4.3.8 Sterilization and Bacteria Testing

4.3.8.1 Disinfection

- 4.3.8.1.1 Disinfection of all new watermains shall comply with the latest edition of AWWA C651. All labor, materials and equipment necessary to perform the disinfection of the completed work shall be done by the Contractor.
- 4.3.8.1.2 Disinfection can be done by tablets placed in each length of pipe or by chlorine injection method.
- 4.3.8.1.3 Tablets Method. The Contractor shall furnish and place H.T.H. sterilization tablets in each length of pipe as it is placed in the trench. The tablets must be secured to the upper inside surface of each length of pipe using Permatex No. 1 compound or equal.

The number of 5 gram, 65% free chlorine, calcium hypochloritic tablets required per length of pipe are:

<u>Inside Diameter of Pipe</u>	<u>Number of 5 gram tablets</u>
4"	1
6"	1
8"	2
10"	3
12"	4
14"	5
16"	7
18"	8 (18' joints)
20"	9 (18' joints)
24"	12 (18' joints)

- 4.3.8.1.4 Injection Method. The Contractor shall furnish all material, labor and equipment for this disinfection method. The Contractor shall submit a Chlorine Injection Plan for review and approval by the Engineer. A Safety

Plan shall be included in the submittal. The Engineer shall have 30 days to review the Injection Plan.

4.3.8.2 Flushing and Sampling

4.3.8.2.1 The City of Vallejo Maintenance Division shall flush the new water main and take samples to the lab for bacteria testing prior to the Contractor making the final tie-in to the existing system.

4.3.8.2.2 In the event that the samples taken by the City result in positive bacteria in the sampled main, the main shall be resterilized by the Contractor using a chlorine injection method and supervised by City personnel. The water main shall again be blown off and resampled by the City. Any resterilization and resampling will be paid for by the Contractor. Further, if the new main is not tied in within thirty (30) days, then it shall be resampled at additional expense to the Contractor. Bacteria samples are only taken on Mondays, Tuesdays, Wednesdays and Thursdays. Results are known after 24 hours.

4.3.9 Connections to Existing Mains

4.3.9.1 General

4.3.9.1.1 After notification that the new main successfully passed its disinfection test, the Contractor shall tie in the new watermains to the existing mains, under the supervision of the City's Water Maintenance Inspector. The Contractor shall complete the tie-in at the locations shown on the drawings and shall do all the excavating, de-watering, and backfill required for tie-ins. The "point-of-connection" for a hot-tap is defined as the downstream side of the tapping valve.

4.3.9.1.2 The new main shall be tied-in to the existing system within 30 calendar days following notification of test results. Failure to complete the tie-in within 30 days shall require a retest for disinfection. All costs for re-sampling and re-testing shall be paid for by the Contractor.

4.3.9.2 Tie-Ins Involving Shut Down

4.3.9.2.1 All fittings, valves and materials to accomplish all tie-ins shall be on the job, and existing lines exposed and checked for proper fit prior to any shutdown.

4.3.9.2.2 Since connections shall result in temporary interruption of service in the area, it shall be essential for the City to give at least two working days of advance notice to the affected consumers. Therefore, the Contractor shall coordinate his scheduling of connections with City activities. In addition,

the Contractor may be required to supply by-pass connections to maintain service to consumers as directed by the Engineer. The Contractor shall receive no additional compensation for such bypasses. The connections shall normally be made on Tuesday through Thursday. Although there may be times when a connection must be made at night, this shall not normally be the case. The Contractor is advised of this situation and no additional compensation shall be allowed for any costs resulting from such required connections and resultant delays. When requested by the Engineer, the Contractor shall provide such assistance as may be required in notifying consumers of water service interruption.

4.3.9.3 Hot-Taps

4.3.9.3.1 Existing watermains will be tapped by City forces unless otherwise approved by the Water Superintendent. Contractor is responsible for providing and installing the tapping sleeve, tapping saddle, tapping valve and all other materials necessary to perform the tap. Traffic control, excavation, backfill and completion of the work to finished grade shall be done by the Contractor. The excavation for the hot tap shall be six (6) feet by eight (8) feet.

4.3.9.3.2 The Contractor shall pressure test the tapping sleeve connection to a pressure of 5 psi for three minutes in the presence of the City Inspector prior to City forces making the tap. The remaining closure piece between the tapping valve and the previously installed new main shall be inspected by the City Inspector. City forces shall operate the tapping valve, for final flushing, before the new main is placed in service.

4.3.9.3.3 The Contractor shall swab the inside of any untested pipe with a liquid disinfection agent per AWWA requirements before the new main is placed in service.

4.3.9.4 Temporary By-Pass Pipes

4.3.9.4.1 When a shutdown is required that will cause any customer or customers of the City of Vallejo to be deprived of water service for periods of time in excess of eight (8) hours during any one day or where so directed by the Engineer, the Contractor shall install a temporary by-pass pipe, generally located on top of the ground. Such temporary by-pass pipe shall include the provisions for service outlets to the water customers and meet AWWA requirements.

4.3.9.4.2 In the event the shutdown involves the interruption of water service to a fire hydrant, the Engineer shall have the authority to require that the temporary by-pass pipe include provision for fire service. In such case the temporary by-pass pipe shall not be less than four (4) inches nor greater

than six (6) inches of nominal diameter and the fire service shall be a single four and one half (4½) inch hose connection with a control valve of a type approved by the Engineer.

4.3.10 Jacked Steel Casing

4.3.10.1 General

- 4.3.10.1.1 The Contractor shall install jacked steel casings to the lines and grades shown on the plans.
- 4.3.10.1.2 The wall thickness of the casing shall be a minimum of ½ inch. The Contractor shall be fully responsible for the sufficiency of the casing provided.
- 4.3.10.1.3 The joints of sections of casing to be jacked shall be welded with a continuous circumferential weld. It shall be the Contractor's responsibility to provide stress transfer across the joints which is capable of resisting the jacking forces involved.

4.3.10.2 Jacking Operations

- 4.3.10.2.1 Before starting excavation, the Contractor shall submit drawings of jacking pit bracing, casing, and jacking head proposed to be used.
- 4.3.10.2.2 Unless otherwise specified, the methods and equipment used in jacking casing shall be optional with the Contractor, provided that the proposed method is approved by the Engineer. Such approval, however, shall in no way relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein. Only workers experienced in jacking operations shall be used in performing the work.
- 4.3.10.2.3 The diameter of the excavated hole shall not be more than 0.1 foot greater than the outside diameter of the pipe. Sluicing or jetting with water shall not be permitted. When material tends to cave in from outside these limits a shield shall be used ahead of the first section of pipe or the face of excavation shall not extend beyond the end of the pipe more than one and one half (1½) feet, unless permitted by the Engineer.
- 4.3.10.2.4 Excavated material shall be removed from the conduit as excavation progresses, and no accumulation of such material within the conduit shall be permitted.
- 4.3.10.2.5 Upon completion of the jacking operations, all voids around the outside face of the conduit shall be filled by grouting with sand or mortar by a method approved by the Engineer.

- 4.3.10.2.6 Grouting equipment and material shall be on the job site before jacking operations and drilling of grout holes are completed in order that grouting around the jacked conduit may be started immediately after the jacking operations have finished.
- 4.3.10.2.7 Should appreciable loss of ground occur during the jacking operation, the voids shall be backpacted promptly to the extent practicable with soil cement consisting of a slightly moistened mixture of 1 part cement to 5 parts granular material. Where the soil is not suitable for this purpose, the Contractor shall import suitable material at his expense. The soil cement shall be thoroughly mixed and rammed into place as soon as possible after the loss of ground.
- 4.3.10.2.8 Should the Contractor meet refusal during the jacking operation, he shall determine the cause of refusal, and take additional measures as required to proceed. Should it become impossible to proceed on the plan alignment, the Engineer shall provide a revised alignment adjacent to the plan alignment. The Contractor shall leave the jacked casing in place, fill it with a sand slurry mix and seal the exposed end of the casing. The Contractor shall then proceed with the installation of a jacked casing on the revised alignment. In no case shall the Contractor remove any casing installed.
- 4.3.10.2.9 Contractor shall install stainless steel casing insulators with polypropylene skids at ten (10) feet on center, and five (5) feet from the ends of each watermain segment.
- 4.3.10.2.10 The ends of each jacked casing shall be sealed with an AWWA-approved concentric rubber end seal, with stainless steel bands and clamps.

4.3.11 Clean-Up

- 4.3.11.1 General - During the progress of the work, the Contractor shall keep all his work areas in a neat and clean condition. As directed by the Engineer, refuse shall be removed in a satisfactory manner as often as may be necessary to prevent any accumulation of rubbish.
- 4.3.11.2 Discharge to Streams - The discharge of solid or liquid waste materials into stream channels from the construction area shall not be permitted at any time. Any substances which are individually, cumulatively or collectively considered toxic or harmful to humans, wildlife, vegetation or aquatic biota, shall be kept under control at all times and shall not be allowed to escape from the construction area. All such substances shall be completely contained during transportation and storage, and used safely without spillage.

4.3.11.3 Materials and Equipment

4.3.11.3.1 Following the completion of any portion of the work, the Contractor shall promptly remove all his equipment, temporary structures and surplus material, except as otherwise provided, and shall satisfactorily dispose of all refuse resulting from the work, leaving the premises in a neat and clean condition.

4.3.11.3.2 Each job site shall be clean at the end of each working day. The Contractor shall remove all dirt, debris, material, etc., which might be an inconvenience or hazard to vehicular or pedestrian traffic. All clean-up operations shall be done to the satisfaction of the Engineer, and final clean-up shall not lag behind the completion of the construction operation by more than three (3) working days.

4.3.11.4 Material Salvage - During the work, all salvageable material, equipment or appurtenances which are removed from existing facilities shall remain the property of the City and shall be returned to the City yard or location designated by the Engineer. The determination of which material is salvageable shall be made by the Engineer whose decision shall be final. Material which is not designated salvageable shall become the property of the Contractor and be removed from the site of the work.

4.3.11.5 Disposal of Materials - (See Section 2.0 of these specifications)

4.3.11.5.1 Concrete and AC Pavement - Broken concrete and asphaltic concrete shall be removed from the site and disposed off by the Contractor to approved disposal land fill site.

4.3.11.5.2 Trench Spoils - All materials from trench excavations shall become property of the Contractor and shall be removed from the site and disposed off in a lawful manner.

4.3.11.5.3 No materials shall be dumped on private or public property without securing the proper permits from the appropriate authority.

4.3.12 Incidental Work

4.3.12.1 Maintain flow in existing sewers by diverting or redirecting and discharging the flow as approved, sanitary sewage to be so treated in closed conduits.

4.3.12.2 Dispose of all ground water, storm water, and sewage from the work, especially from excavations and subgrade. The Contractor shall employ pumps for this purpose whenever necessary and such work shall be considered as incidental to protection of the excavations and the subgrade. If the proposed work may be performed during the rainy season, the Contractor

shall act to maintain existing drainage facilities by working carefully around them. He shall not divert water on private land nor permit water to pond. He shall not inconvenience the public or jeopardize its safety.

- 4.3.12.3 All Stockpiled material and parked equipment at the job site shall be located to avoid interference with private property and to prevent hazards to the public. Locations of stockpiles and parking areas must be approved by the Engineer.
- 4.3.12.4 Remove all surplus concrete and mortar from the site of the work and not dump any portion thereof, or any washings from concrete mixers or mixing boxes, upon paved streets, into catch basins, or otherwise into the City sewer system.
- 4.3.12.5 At all times during work performance, the Contractor shall exercise proper and efficient measures to prevent his operations from producing dust in amounts which may cause damage to property or a nuisance to persons in the general vicinity of the work. Water to settle the dust may be available from the City's facilities. If City water is not available, the Contractor, at his expense, shall arrange for alternate sources of water.
- 4.3.12.6 Protect the public from dust nuisances and avoid damage to property affected by the work by adequately sprinkling the work site with water as often as necessary to effectively control dust.
- 4.3.12.7 Remove from the site of the work all rubbish, unused material falsework, loose earth, rock paving materials, and any other materials, leaving the site in a clean and neat condition.
- 4.3.12.8 At the end of the work day, all streets affected by the construction work shall be broom swept. Once a week, they shall be power swept and vacuumed.
- 4.3.12.9 When any work is performed at night, in a tunnel or in a place where there is little or no daylight, the Contractor shall provide artificial light sufficient to prosecute the work properly and safely and to permit thorough inspection of the work.
- 4.3.12.10 The Contractor shall take all necessary steps to minimize the inconvenience to the general public throughout all the work under this contract. No driveways or private roads shall be blocked without notifying the property owner and access must be restored during all non-working hours. Safe access must be maintained for pedestrian and traffic throughout the work area at all times.

SECTION 5. LANDSCAPE & IRRIGATION

5.1 Landscape & Irrigation Design & Construction Standards

5.1.1 General – The design of irrigation shall conform to Section 7-902 of the California Department of Transportation Highway Design Manual, as well as the following applicable standards:

- “General Notes for Installation of Landscape Maintenance Areas in the City of Vallejo,”
- “Landscape Guidelines for Hillside Developments,”
- “City of Vallejo Approved Tree List for Street and Median Planting”
- “City of Vallejo Grass Hydroseeding Standards for Erosion Control on Slopes and for Open Space Areas,”
- “City of Vallejo Approved Grass Seed List for Erosion Control on Slopes and for Open Space Areas,”
- Section D of Specifications for Maintenance of Landscape Districts within the City of Vallejo” (for the current year),
- “Design Guidelines: Hiking and Equestrian Trails.”
- “City of Vallejo Tree Preservation Specifications General Notes and Standards”
- “Model Water Efficient Landscape Ordinance AB 1881”

Copies of the above, and other related standards can be obtained from the Engineer. Clarification as to the applicability of such standards to a particular project can be obtained from the Engineer. Failure to conform to applicable standards or these specifications will result in the engineer directing corrections of deficiencies any time during plan review, landscape installation or the maintenance periods.

5.1.2 Specialists – The developer/owner shall retain the services of a landscape architect or irrigation designer, all of whom are currently licensed in the State of California. The services of these specialists shall be coordinated to produce the best irrigation design acceptable to the city. The developer/owner shall be responsible to include the comments and certifications of the Soils Engineer and/or a Civil Engineer in the irrigation design where there is any concern about irrigation and slope stability or drainage.

5.1.3 Soils Analysis Report – A lab test shall be made of the topsoil on site to determine suitability for irrigation. The selection of plant material, fertilizers, soil amendments, soil conditioners, and irrigation systems, shall address, in particular, the needs as indicated in the soils analysis report. A copy of the soils analysis report shall be given to the Engineer prior to beginning any irrigation or landscaping work. Soil pH composition, organic content, and chemical analysis shall be indicated in the report. Known or suspected toxins or infestations on site shall also be investigated by means of preparing the soils analysis report. Another soils analysis report may be required by the City Engineer 90 days before the one year landscape maintenance period is scheduled to end to confirm that the soil has been amended per the soil report.

5.1.4 Landscape & Irrigation Site – The design shall address the site in the following areas of concern:

1. Topography and drainage.
2. Available water source(s), quality and pressure(s).
3. Existing trees and other features desirable of preservation.
4. The location of existing and planned hardscape features and utilities.
5. Available power sources for irrigation controllers.
6. The method of containment or neutralization of existing toxins, infestations and noxious weeds.
7. Suitability of plant, irrigation and fence type selection for local environmental concerns as follows:
 - a. Vandalism
 - b. Predictable foot and vehicle traffic
 - c. Prevailing winds
 - d. Exposure to the sun
 - e. Frost and cold
 - f. Fire hazards
 - g. Cost estimate for all future City maintained items shown on the Plan.
 - h. Relation of the mature landscape to all of the above.

- i. Compatibility of selected plant material, e.g., drought tolerant versus high water usage plants.
- 8. History of the site and concerns by the City, developer/owner, or any specific area plan.
- 9. Relation to adjoining landscapes as follows:
 - a. Street tree selection and location
 - b. Type and quality of fencing
 - c. Successful plant material in the area
 - d. Planting themes in the area
 - e. Continuation of public pathways
 - f. Preservation of views
 - g. Protection of privacy
 - h. Protection of environmentally sensitive areas
 - i. Consideration for crime prevention

5.1.5 Water Conservation – The City of Vallejo is actively engaged in a water management plan. All irrigation systems and landscapes shall be designed using the Model Water Efficient Landscape Ordinance AB 1881 of the California Code of Regulations (or replacement bill) as a standard.

5.1.6 Non-Potable Water Use – The City of Vallejo does not allow the use of non-potable water for irrigation watering. All irrigation shall go through Vallejo Water Engineering, using domestic water provided by the City.

5.2 Landscape & Irrigation Materials

5.2.1 General – All materials provided by the contractor shall be a new or viable. Materials shall be free of any contamination or damage. Materials not specifically addressed in these specifications or associated notes and drawings but are understood as necessary to complete a project as a matter of industry standards shall nevertheless be provided by the contractor. Substitutions of materials must be approved by the Engineer. Any materials deemed unacceptable by the Engineer, his representative or the landscape architect must not be shipped to the

landscape site, or if already on-site, shall be removed from said site the same day. All materials which conform to the standards of the specifications shall be installed.

5.2.2 Materials Furnished by the City – The following materials, unless otherwise noted by the City, shall be furnished by the City and paid for by the developer/owner.

1. Water meter, the water meter box and adjustable spuds.
2. Backflow prevention device, and protective cage, if required. – A Febco double check device and assembly, with GuardShack enclosure and pre-manufactured enclosure pad.

5.2.3 Soil Improvements

1. Imported topsoil – Should topsoil have to be imported to the landscape site it shall be predominantly a friable loam in nature, obtained from well drained arable land. It shall be free of roots, rocks, debris and other heavy materials. It shall have a pH between 7.0 and 6.0 and meet the following allowable analysis or composition: as verified by an agricultural suitability test.
 - a. Sodium (SAR), 0 – 4 maximum
 - b. Salinity (ECeX10³), 0 – 2.5 maximum
 - c. Boron (in PPM saturated extraction), 0 – 2
 - d. Decomposed organic material, 5 – 50%
 - e. Gravel no greater than ¾ inches, 0 – 10%
 - f. Coarse sand, 5 – 20%
 - g. Fine sand, 20 – 50%
 - h. Silt, 15 – 25%
 - i. Clay, 5 – 15%
2. Fertilizers – All fertilizers must contain the manufacturer’s warranted analysis on each container which will clearly state the compositions of N (Nitrogen), P (Phosphorus) and K (Potassium) as well as any secondary or micro nutrients. Each type of fertilizer applied as a general soil improvement must be able to respond to the particular soil composition, pH, solubility and species demand of an area to ensure optimum usage. The fertilizer should be the one that best addresses the shortages revealed in a soils analysis as compared to the needs of the plants

introduced area by area. Changes of or additions made in fertilizers must also anticipate other improvements made in the soil. Fertilizers applied during the establishment maintenance period should obtain approximately one (1) pound N minimum per 1,000 square feet bimonthly for most selections of plant material. At no time can N derived from an ammonium be used in a mix. The final application of fertilizer at the end of the establishment period must address deficiencies shown in the final soils analysis taken near the end of that same period.

3. Mulches and top dressing – Unless otherwise specified for specialized situations, all mulches and top dressing shall be small grade “walk on” type bark with an average particle size of approximately ¼ inch. It shall be well aerated and free of debris (both organic and manmade). Mulch which has been allowed to “sour” at the bottom of stockpiles cannot be used.
4. Gypsum and other soil modifiers can be used as the soils analysis indicates.
5. Soil conditioners for planting pits shall be as required by the soil report for each specific project.
6. For non-irrigated plantings, synthetic based water absorbent polymer gels shall be added to the backfill at the manufacturer’s recommended rates.

5.2.4 Irrigation Equipment

1. Pipe and fittings – All mainline and lateral pipe and fittings shall be schedule 40 NSP PVC solvent welded. The pipe shall meet ASTM-D-1784 standards. The fittings shall meet ASTM-D-2466 and NSP 14 standards. All pipe shall be marked continuously and permanently with the manufacturer’s identification of type and quality control. The ½ inch drip bubblers shall be run using Agrifim IPS flexible schedule 40 vinyl pipe (or approved equal). Pipe Joining Materials – PVC solvent cement shall be IPS Weld-on #711 heavy bodied (or approved equal). It shall conform to ASTM –D-2564 standards and rated for all classes and schedules of PVC up to 12 inch pipe. No fast setting solvent cement may be used. The one exception to this cement being used is when installing flexible vinyl pipe. When making these connections, use the primer as described below prior to applying Weld-on #795 specialty cement. Primer shall be IPS Weld-on #P-70 (or approved equal). It shall conform to ASTM-F-656 standards. Only Teflon tape may be used to join threaded fittings. No pipe dope may be used. Sleeves and conduits for paving crossings shall also be schedule 40 NSP PVC pipe.
2. Valves and Valve Boxes
 - a. Remote control valves shall be Rainbird PEB series or equal. In low volume situations DVF series may be used if needed. All valve assemblies will include an isolation valve and union as shown in the City Detail Drawings.

- b. Isolation valves shall be the non-rising stem all brass gate valves, such as the 'T' model by Nibco, or a City approved PVC valve. A slip only (no threaded) schedule 40 ¼ turn ball valve can be placed upstream of the remote control valve.
 - c. Quick coupler valves shall be the two part all brass type with self-closing and locking rubber cover such as '44-LRC' series by Rainbird. Each site shall be provided with two (2) all brass quills mounted by all brass swivel hose bib as well as two (2) quick coupler cover keys. Swing riser assembly and staking shall be as per the City Detail Drawing.
 - d. Master Control valves shall be normally open, and be programmable by the controller.
 - e. On all drip installations 'Rainbird PRF-XXX-RBY' pressure regulator/filter units, or equal, are to be used.
 - f. Check valves for pop-up spray heads shall be built-in Seal-A-Matic ('Rainbird SAM) or equal. Check valves (or anti-drain valves) can be the Valcon 'ADV-5000' series or the KBI 'CV' series located in-riser (or approved alternatives). These should be used when installing in-line emitter hose for every 5 feet of elevation change.
 - g. Valve boxes for all remote control valve assemblies, quick coupling valves and flush valves assemblies servicing lateral runs longer than 60 feet shall be the NDS model #1419 with bolt down lid (or approved equal). Valve boxes for isolation valves which stand alone and flush valve assemblies servicing lateral runs 60 feet or shorter shall be the NDS model #1100 with bolt down lid (or approved equal). Only one valve assembly per box will be allowed. The valve and the top of the lid shall be tagged and marked as called for in the City Detail Drawings. Location of valves shall be as indicated in the City Detail Drawings.
 - h. Pea type gravel free of other aggregates, fines, debris, soils and organic materials shall be placed at the base of all valve box pits to the depths indicated in the City Detail Drawings.
3. Head Assemblies
- a. All heads shall be installed on the swing joint assembly as indicated in the City Detail Drawing. Fittings shall meet ASTM-D-2464 standards.
 - b. No above-ground spray head on fixed risers shall be employed in lawn areas or shrub areas. No above-ground head shall be used where a 12 inch pop-up spray head can be employed.

- c. Pop-up heads should be Rainbird 1800-SAM-PRS series, or equal. Rotors should be either 5000 or 8005 series with SAM, depending on application (or approved substitutions).
- d. All heads shall be set perpendicular to finished grade unless otherwise designated by approved drawings, the Landscape Architect or the Engineer.
- e. Heads shall be added, adjusted or relocated to assure optimum precipitation over the area to be covered. No head shall be situated so that it shoots directly into the opening end of the controller box or other utility boxes. Performance shall conform to the requirements of the 'Model Water Efficient Landscape Ordinance AB 1881'.
- f. When a lateral line has a grading change over 5 feet, heads with check valves should be used.
- g. If operating pressure exceeds 50 psi in a pop-up spray lateral line, pressure regulators should be specified in head body, such as 'Rainbird-SAM-PRS' series or equal.

4. Drip Assemblies

- a. Absolutely no ¼ inch drip emitter lines will be allowed.
- b. All drip emitter (bubbler) assemblies shall be installed per City detail, extending from schedule 40 PVC lateral lines.
- c. The single outlet emitter (bubbler) shall be the Rainbird 1400 series (or approved equal) mounted on a length of Agrifim vinyl IPS flex-PVC pipe.
- d. For multiple outlet emitter installation use in-line drip hose. Rainbird XFD series drip line should be used. "Blank" hosing can be used between plantings to avoid water waste.
- e. When elevation changes more than 5 feet, check valves should be plumbed into hose.
- f. Use an air/vacuum relief valve kit when installation is below soil.

5. Electrical Service

- a. All wire connections shall be made with copper wire crimps enclosed with a DB series (or approved equal). Epoxy type sealers or electrician's tape and wire nuts will not be allowed for wire connections.
- b. Wire for all 24 volt or 120 volt service shall be #14 gauge solid strand copper for damp and wet locations. It shall be rated at 600 VAC THHN/ THWN AWG and

meet the National Electric Code and Underwriter's Laboratory standards. Protect all wire bundles from damage during assembly of bundle and during burial.

- c. Electrician's tape or duct tape can be used to bind bundles of 24 volt wire at 10 foot intervals for direct burial. Direct burial shall be made in irrigation pipe trenches as shown in Detail Drawing No. 5-1.
- d. Insulation for common wire shall be white in color, black or red for station/signal wire and yellow or blue for extra/spare wires. Two (2) spare wires shall be provided at the end of each run of main line. (For example, if the layout of the main line is in a 'Tee' configuration, provide (2) extra wires for each leg of the 'Tee').
- e. 2-Wire Systems: Provide specific wire compatible with specified 2-wire system, (14 or 12 AWG) along with decoders, surge protection and flow sensor. The maximum 14 gauge cable run shall be:

Star Pattern: 2.4 miles
Loop Pattern: 9.6 miles
- f. Decoders: The decoder shall be fully encapsulated creating a completely waterproof seal. The decoder shall be gray in color. The line surge protector decoder shall be yellow. The sensor decoder shall be green. The decoders shall be direct burial capable. The maximum decoder/solenoid 14 gauge cable run shall be 456 feet. Wiring for the decoders shall be a specified double jacket wire.
- g. All 120 volt power wire shall be housed in a heavy-walled utility class PVC conduit with factory made bends, couplings and fittings where permitted by the NEC. Burial for all 120 volt power service shall be made at a minimum depth of 18 inches.
- h. For Evolution installations there will be a grounding rod installed. It should be copper coated and 8 feet by $\frac{3}{4}$ inches diameter. It shall be attached to the junction box at the controller by means of a solid copper ground jumper and approved clamp.
- i. The junction box shall contain a 120 volt SPST off/on switch, standard plug receptacle, and ground screw. It shall be attached to the inside of the controller pedestal or security enclosure chassis.
- j. Pull boxes shall be the NDS 1100 series (or approved equal) with bolt-down lids.
- k. Before burial, wiring shall be proved to be continuous and protected by coating. 2-wire systems shall be double jacketed wire.

6. Controllers
 - a. All controllers shall be ET smart controllers with temperature and rain sensing technology. All new LMD installations should be Evolution DX2 controllers tied into the City's existing central control system. Install controllers per specific detail shown on plan. For private commercial installations and rehabs of existing City sites the preferred manufactures are Rainmaster, Aqua Conserve and Rainbird.

5.2.5 Planting Materials

1. Hydroseed – Refer to the “City of Vallejo Grass Hydroseeding Standards for Erosion control on slopes and for Open Space Areas.”
2. Seeded Lawn – Seed shall be a minimum of 98 percent pure and zero percent noxious weed seed. Only re-cleaned Grade A “new crop” seed delivered in unopened containers bearing the dealer’s label showing guaranteed analysis shall be used. The seed shall be pre-treated with a fungus preventative. Any seed allowed to become wet or moldy or otherwise damaged will not be accepted. Packages must display date of harvest.
3. Sodded Lawn – Sod shall be at least 9 months old and no more than 16 months old, and field grown by a commercial sod nursery. It shall be healthy and well knitted containing no more than ½ inch of thatch and free from unspecified grasses, pests or noxious weeds, insect eggs debris or infestations of any type. Sod shall be delivered in moist rolls within 24 hours of harvesting. Sod will be cut with a thickness of 5/8 inches to ¾ inches and dimensions of 18 inches by 72 inches.
4. Rooted Cuttings – Only healthy rooted cuttings or flat grown material may be used. Material shall be grown by a commercial nursery and be delivered moist to the job site within 24 hours. Material that is too wet or too dry or showing signs of fungus or other infestation shall not be acceptable. All material shall exhibit good root growth. Roots shall constitute at least 20 percent if individual plant material for all specimens (except Carpobrotus chilensis which may be employed as sprig cuttings with little or no rooting). No root girdled material will be accepted.
5. Container Grown Specimens – Only the No. 1 grade of nursery stock as provided in the State of California Grading Code may be planted. Plants shall conform to the American Association of Nurserymen Standards, AAN-SI Z60.1 as well as any height, spread, symmetry or caliper as indicated in drawings or specifications. Plants shall be delivered unpruned in the original nursery containers bearing tags which show genera, species, cultivars, and/or varieties. All shipments of container grown specimens shall show documented compliance with Federal, California and regional laws having to do with diseases and infestations. Plants which do not comply with the above or are shown to be broken, root bound, too young for the

container, sun burned, wind burned, too dry, infested, trunk damaged or bare root specimens shall comply with the above as is applicable.

6. Transplanted Specimens – Only healthy unpruned specimens shall be delivered to the job site within 24 hours of uprooting. Root mass shall be sufficient to anchor and sustain the plant. Roots shall be cut clean. Broken, stripped, or frayed roots will not be acceptable. Any trunk or branch which has been girdled, stripped, broken or marred during uprooting, transport or planting will not be acceptable.
7. Tree Stakes – Only treated (2 inches by 8 feet for 5 – gallon and 15 – gallon size trees, 3 inches by 12 feet for 24 inch box and larger size trees), straight, close grained, lodge pole pine shall be used. Treatment shall penetrate the stake surface to a minimum depth of ¼ inches. The blunt end of the stake will be cut to the appropriate height for individual trees on-site.

Tree Ties – Rubber tire strips (or approved alternatives) shall be used.

Tree Tie Nails – Only galvanized steel nails shall be used.

Tree Guys – Use aircraft cable, inserted through white ½ inch PVC pipe (as markers for pedestrian safety). Use sections of rubber tree tires (for protection of tree limbs). Fastened to dead man buried below grade (or approved alternatives) and wire rope type clasps. Deadmen, if employed as alternatives, shall be durable materials (not wood).

8. Deep Root Barriers – Barriers shall be continuous barriers, 18 inches deep, plastic roll with raised ribs facing planter areas. Barriers shall be installed at perimeter of planting pit only on sides facing hardscape areas. If tree is located in narrow strip between hardscape, install barrier on multiple sides.
9. Street Trees – Refer to the “City of Vallejo Approved Tree List for Street and Median Planting.”

5.2.6 Hardscape Features

1. Plastic Headerboard – Headerboard shall be Trex plastic, or equal, 2 inch by 4 inch, staked every 3 feet on center with 1 inch by 2 inch by 12 inch plastic stakes. Install stakes 1 inch below top of headerboard. Use galvanized steel deck screws to attach stakes to headerboard. Use only matching material for splices, minimum 2 feet in length, overlapping 1 foot on each side. All headerboard shall be true, straight, set to required lines and grades, and installed according to plans and manufacturer’s recommendations.
2. River Cobble – Only 4 inches to 6 inches aggregate Lodi or Linn Creek type cobble shall be used where better than 66% are unbroken, better than 66% are near 5 inches in size, and 66% are smooth spherical or egg like in shape.

Mortar for River Cobble – As per section 51-1.135 of the Standard of Specifications.

3. Decomposed Granite – Only decomposed granite in an aggregate grade between $\frac{3}{4}$ inches and fines can be used as specified. They shall be free of other aggregates, debris and organic materials.
 - a. Organic Binder – A non-toxic, colorless, odorless, non-staining, concentrated organic powder that binds soil and crushed aggregate screenings together, creating a natural-appearing, firm surface shall be used (or approved equal). Application shall be as per written manufacturer’s recommendations, minimum application rate of 12 lbs./ton.
4. Imprinted Concrete – Only the Bomanite process (or approved equal) shall be used. The concrete shall have a minimum compressive strength of 3,000 psi. Portland cement shall conform to ASTM C 150, Type I, II, or V, depending on soil conditions. Aggregates shall conform to ASTM C33. Only potable water may be used. At no time can calcium chloride be introduced into the concrete mix. Only Bomanite Heavy Duty Hardener and Bomanite Color Curing Compound (or approved equals) may be used.

5.2.7 Pesticides – All applications shall be made in strict conformance with the pest control advisor’s written recommendations, the manufacturer’s label, and industry standards for safe use and disposal. Applications shall be made under the supervision of a licensed pesticide applicator who is registered with and reporting to the Solano County Agriculture Commissioner. A material safety data sheet and the adviser’s recommendations shall be provided to the engineer before application begins. No pre-emergent or post emergent herbicide shall be applied within 12 inches of the dripline of any plants.

5.3 Landscape & Irrigation Construction Standards

5.3.1 General – All work performed as site preparation, installation of irrigation systems shall comply with Standard Specifications Sections 20, “Erosion Control and Highway Planting” as well as hereunder. All irrigation systems shall be designed using the Model Water Efficient Landscape Ordinance AB 1881 of the California Code of Regulations as a standard. In addition, the following requirements should be considered when designing an irrigation system within the City. The contractor performing such work shall be currently licensed with the State of California and hold or obtain all other licenses, certificates, permits or waivers during the course of said work necessary to performance. Contractor shall also have a current City of Vallejo business license. Clean up shall be a part of any installation work.

5.3.2 Site Preparation

1. Site conditions – The irrigation site shall be free of all debris, stock piles, toxic spills, equipment, structures, and other unnecessary appurtenances left by other trades and former property users.
2. Sleeves and conduits – All necessary crossings for irrigation systems shall be in place prior to paving or V-ditch construction as per the “General Notes for Installation of Land- scape Maintenance Areas in the City of Vallejo”. Indicate sleeve locations on As Built. Show location using triangulation from fixed objects (minimum two locations). Contractor shall also provide visual markings to locate sleeves in future, by either painting or grinding marks on curbs, sidewalks or other hardscape, as directed by the City Engineer.
3. Points of connection – A secondary box or meter pedestal for 120 volt service and water meter, box and backflow prevention device for irrigation shall be prepaid and installed as per the “General Notes”. The concrete meter box shall be set to finish grade. At no time can materials capable of deterioration (such as wooden boards) be employed to raise any meter or valve box to finish grade. Durable materials (such as basalt blocks or fire hardened bricks) shall be used in sufficient quantities to support any valve or meter box in order to raise it to finish grade. Care shall be taken throughout all phases of installation and maintenance to protect materials provided by PG&E and the City.
4. Grub and clear – All noxious weeds on-site must be destroyed. Other weeds may be removed as needed. Groundcovers that had been provided by hydroseeding for erosion control can only be removed during the rainy season, (between October 15 and April 15), upon approval by the Engineer. To obtain such approval, the contractor must provide proof or assurance of timely re-vegetation. A combination of pre-emergent and post-emergent spray programs as designed by the Pest Control Advisor and manual and mechanical means may be employed by the contractor as needed. All weed or related debris shall be disposed of in an approved manner and/or outside of the City.
5. Fuel suppression for fire safety – In the event of any delay between completion of mass grading and the start of landscape installation during the fire season, the developer/owner is to understand hereby that time is of the essence in performing such fuel suppression during the fire season.
6. Fence and property lines – Such lines shall be established as per the “General Notes for Installation of Landscape Maintenance Areas in the City of Vallejo”.
7. Hydroseeding – Shall be don as per the “City of Vallejo Hydroseeding Standards for Erosion Control on Slopes and for Open Space Areas”.

8. Pre-construction meeting – Such a meeting shall be held as per the “General Notes”. No further landscape related work may commence save any of the above necessary to site preparation. The pre-construction meeting shall be the time and place to determine that any other work (as in the below) may proceed.

5.3.3 Irrigation Systems

1. All irrigation systems shall be installed and tested as per the “General Notes” and pertinent City Detail Drawings.
2. Excavation for irrigation trenches shall be performed to cause the least possible damage to streets, side-walks, utilities and other improvements. No trenching of paved streets in a City moratorium will be permitted. Care shall be taken not to interfere with trees. Route the trench a minimum of 6 feet away from tree planting locations and outside the drip line of existing trees. In the event tree roots have to be cut, such cuts shall be made clean without any ragged stripping, fraying or twisting of the roots. Where roots of a diameter greater than 2 inches are encountered, the City Landscape Inspector shall be contacted for direction. Trenches shall be cut consistent with grade and uniform bearing for the full length of the line. Any improvements or plantings disturbed by excavation shall be replaced or reconstructed in an approved manner. Excavated material shall be placed so as not to cause damage to improvements or plantings nor obstruct traffic (vehicular and pedestrian) or surface drainage.
3. PVC pipe shall be cut with a fine tooth hack saw or PVC cutter and any burrs shall be removed. The pipe and fittings shall be clean and dry prior to application of solvent cement. All pipe ends and fitting sockets shall be treated with primer prior to application of solvent cement. Both primer and solvent cement shall be applied uniformly over three quarters of both insertion surfaces. The types of primer and cement approved by the city are described under section 5.2.4.1. Any pipe or fitting where solvent cement had been allowed to thicken prior to joining shall be discarded. Immediately after cement has been applied pipe and fittings shall be joined with a twisting motion to the full depth of the socket and any excess wiped away. At no time can cement be allowed to cover threaded fittings. Joined pipe and fittings shall be allowed to set up prior to any further handling. Time for curing will increase with damp and / or cold weather. Only pipe with completely cured welds can be filled with water. The male connection of threaded joints shall be wrapped with a modest strip of Teflon tape. Excessive layers of Teflon tape and/or any pipe dope will not be allowed on threaded joints. Also, excessive cinching will not be allowed. No PVC pipe shall be exposed above ground. Mainline shall be placed a minimum depth of 18 inches and lateral line 12 inches in the trench.
4. Valves shall be installed in such a way that easy access and service are possible. No valve (except in- line check valves) shall be buried or silted over. No valve shall be placed inside a box in such a way that handles and bleeder cocks are held tight against the box wall. If necessary, a larger valve box shall be set. It shall be

possible to lift the bonnet of the remote control valve without dirt and debris sliding inside the valve body. It shall be possible to remove filters from “Y” strainers without digging. The valve stem of the remote control valve shall not be left in a fully open position. It shall be throttled two (2) full turns down to avoid the valve becoming “stuck on” but still allowing optimum operation. All valve boxes shall be bolted securely shut. No debris from valve assembly or wiring shall be left inside the valve box. The locations of quick coupling valves shall be marked in an approved fashion.

5. Heads shall be installed as specified. All risers shall be flushed prior to assembly of clean head units. Subsequent flushes of end risers on each lateral line shall be performed during each maintenance period. Dissimilar heads shall not be placed on any station system.
6. Drip emitter line distribution tubing shall be installed subterranean.
7. All electrical service shall be installed strictly as specified. No wire splices shall be made in the field outside approved controller box, valve box, and pull box locations. Upon installation of irrigation wiring a test shall be run to demonstrate successful laying and hook up of wiring. A voltage meter shall be used to demonstrate that there are no dead shorts or earth ground connection along wiring or at valve hook up. Do not walk on wiring during layout or installation. Lay wire bundles on clean non-abrasive surfaces. Nicked or cut wire shall be removed and discarded and new wire installed. Wire shall not be pulled taut at any location. Expansion loops, coils and serpentine runs shall be liberally turned into every pull of 24 V wire. Wire splice ends shall not be exposed to wet or damp conditions. In the event of delay between pulling and connecting wires the splice ends shall be covered securely with electricians tape and pulled up out of the bottom of boxes or water catching depressions in the soil. New splice ends will be cut at the time of connection. The controller shall be supplied with backup batteries and penciled (not penned) schedule at time of installation. Electrical service shall not be tested by touching any charged wire to the circuit board or battery wires of the controller (an Ohm-meter is best used for such tests).
8. Irrigation lines (main and lateral) shall be hydrostatically pressure tested. The City representative shall be contacted at least 48 hours in advance for observation and approval for all testing. The main line shall be tested at 125 psi. There shall be a pressure gauge at the pump and another at the end of the section of line that is to be tested. Testing shall be from each valve to the end of each system. The line shall hold the required pressure for a minimum of four hours. If there is any drop in pressure, the line shall be retested until there is no drop in pressure. The lines shall be filled with water from the low end and the air expelled from the high point. All air must be removed from the line before the test shall begin. Lateral testing will be done on random lateral lines, the number of which will be determined by City inspector at least 48 hours in advance in order for the contractor to have sufficient time to prepare. Testing the lateral lines will necessitate the capping of all risers.

For drip bubbler line pressure tests, an elbow should be installed after the pressure regulator and filter to temporarily isolate them from the test. A quick-coupling can then be attached to this elbow for the test to be conducted. All vinyl pipe lines should be capped at the male adaptor for this test. Valves that control in-line drip hose are not subject to a pressure test.

9. A coverage test will be made of the irrigation system via manual control or pre-timed control from the irrigation controller by a City representative. Spot checks may be made by “bleeding” individual remote control valves, but this method shall not be substituted for an overall coverage test. Adjustments and cleaning of irrigation components shall be made, as needed, as a result of a coverage test and a new coverage test subsequently made.
10. All tests are subject to City inspection and approval.
11. All new controllers in LMD areas shall be Evolution DX2 controllers which will be connected by phone or radio to the City’s Central Control System. Each Evolution shall have its own normally opened Master Valve and Flow Sensor. These controllers must be certified by John Deere prior to acceptance. The telephone hook-up is the contractor’s responsibility. Prior to the final walk-through, all of the optimal amperage and flow values will be set in the controller’s software. Three sets of laminated as-builts will be delivered to the City Inspector prior to acceptance. All sleeves coming through controller pad shall be puttied to eliminate bug intrusion. The base of the controller will be sealed using silicone. The contractor will be responsible for the controller to communicate and be hooked up to the City central Oasis system and be functioning properly, prior to approval and acceptance by the City.
12. All private commercial installations must be designed using the “Model Water Efficient Landscape Ordinance AB 1881” of the California Code of Regulations as a standard. Approved ET based controller manufacturers are Rainmaster, Aqua Conserve and Rainbird. All distribution should be in accordance with the materials list described in section 5.2.3.

5.3.4 Soil Preparation and Fine Grade

1. All areas to be landscaped shall be prepared according the “General Notes”, “Landscape Guidelines for Hillside Developments” and related standards and specifications. All specified soil conditioners, soil amendments and fertilizers shall be thoroughly mixed with the topsoil in areas to be planted as lawns and groundcovers. All clumps and clods of topsoil shall be broken and mixed in.
2. All rocks, debris, and excess soil shall be removed from the site and disposed of in an approved manner and/or outside of the City.

3. Wherever possible topsoil native to the site shall be utilized as fill in the fine grading process. The developer/owner will have provided for stockpiles of native topsoil during mass grading. Though such topsoil will have been distributed, remnants of the stockpiles might be located and utilized.
4. Tops and toes of slopes shall be rounded to produce a gradual and natural appearing transition between relatively level areas and slopes.
5. Fine grade is to provide a smooth even finish and positive surface drainage without low spots or pockets. Undulations in slope-sides which result in specific grades steeper than the overall intended grade of the slope shall be corrected. Finish grade at edges shall lay the following inches below the level of pavement and header boards:
 - a. ¼ inch – ½ inch for bare ground, hydroseeded, and non-mulched groundcovers
 - b. ½ inch – ¾ inch for lawn areas
 - c. 1 inch – 2 inches for mulched areas
6. The site shall be checked to be sure that soil preparation and fine grading have not resulted in bringing subsoils to the surface or causing public and private properties to drain into each other. Any such problems shall be brought to the Landscape Inspector's attention.
7. All phases of soil preparation and fine grading are subject to City inspection and approval. The finish grade must be complete and irrigation systems fully operational before planting can begin.

5.3.5 Planting

1. All planting shall be performed as per the City Detail Drawings, all related standards and specifications and the approved landscape plan.
2. The contractor shall provide a certified landscape technician as supervisor or foreman, capable of reading the landscape plans and related specifications and who is familiar with current California horticultural practices, to oversee all aspects of planting. Such a foreman shall concern himself with close on-site supervision of the following:
 - a. Proper species identification and location.
 - b. Excavation of the planting pits with particular attention given to scarification.
 - c. Identification and application rates of fertilizers and amendment (matched with soil test recommendations) to be used in the backfill mix.

- d. Proper manipulation of the root ball to encourage future outward growth of roots.
 - e. Planting techniques which do not allow the root ball to be set too low or the root crown covered with backfill or siltation.
 - f. Approved staking and pruning techniques.
3. Planting pit amendment must match soils report recommendations.
 4. Seeding for lawn areas shall be performed only during the warm months between March 1 and October 15. The lawn area shall be free of weeds and debris and be fertile and friable the day of seeding. Seeding may be done either by double passes of a mechanical spreader or by hydroseeding. Mechanically sown seed shall be raked into the surface and rolled. Either application shall be kept moist until full germination. Bare spots shall be reseeded at 10 day intervals until a full stand of grass is germinated.
 5. Sod can be placed in lawn areas any time during the year. The soil shall be in the same condition as for seeding (in #4 above) and fertilizer applied the same day as sod delivery. Lay sod in a tight fitting staggered brick layer pattern against any grade. Rolls of sod shall be kept moist throughout installation. All sod shall be installed the same day as delivery. Keep sod moist until first mowing. Roll sod twice within two days of installation. Care shall be taken not to leave footprints in the soil surface or sod.
 6. Ground covers taken from flats or rooted cuttings shall be planted in the bare soil surface prior to any mulching so as to ensure true root to soil contact. A staggered or triangular pattern shall be employed. Specimens shall be placed in a pit of sufficient size to prevent roots from doubling over. Newly planted ground covers shall be kept moist.
 7. Areas (other than lawns and hydroseeded wildflowers) shall be mulched.
 8. Newly planted trees will have to be deep watered during hot months.
 9. All specimen locations and plantings are subject to City inspection and approval.
 10. Replacement plantings will be expected, no matter what caused the loss, at the end of the installation period, at the end of the interim maintenance period and at the end of the one year maintenance period. Seasonal considerations may necessitate replacements at other times.

5.4 Landscape Maintenance

5.4.1 General – Landscape maintenance performed during installation, during the interim maintenance period and during the one year maintenance period shall be in compliance with applicable portions of the current “Section D of Specifications for Maintenance of Landscape Districts within the City of Vallejo.”

5.4.2 Non-Irrigated Planting – Non-irrigated plantings shall have a maintenance period which encompasses two full rainy seasons.

SECTION 6 PUBLIC FENCING

6.1 Fencing Design Standards

6.1.1 General - The design of fencing shall comply with project area guidelines, specific area plans, sound abatement conditions, traffic control and related conditions, as well as these standards. Gates and other opening designs shall also be in compliance, where applicable.

6.1.2 Continuity - All frontage, perimeter and other public fences shall exhibit consistent or complementary materials, colors, detailing, height and alignment. Where contiguous with other developments and improvements, similar fence designs shall be employed.

6.1.3 Accessibility - Where access will have to be made to park sites, school sites, open space areas, or other public landscapes as well as to specific utility improvements specially created easements or dedicated parcels will connect traffic from such areas through frontage or perimeter fencing to the public right of way. All such fences shall allow safe and convenient gate access for emergency and maintenance vehicles of various City departments, other agencies, districts and utility companies or their representatives. Additional gates or openings may be required for other forms of maintenance, recreational or through traffic (pedestrian, equestrian or bicycle). Private access gates through public frontage or perimeter fences to public lands cannot be allowed (except, where easement rights or other special conditions prevail). At no time can a fence be located in such parallel proximity to another fence (existing or planned) that weed abatement for fire safety cannot be conveniently performed between the two. No grading, improvements, structures or landscaping can be located next to a public fence in such a way that the integrity or future maintenance or repairs of that fence are compromised. Access control may be required off of public right of ways into open space areas. In these situations fence and gate or related structures (including appropriate signage for the site) are to be installed.

6.1.4 Durability - These standards set the minimum criteria to ensure a long lasting fence and gate installation in Vallejo. Fencing shall also comply with applicable requirements of the Standard Specifications Section 80. Where these and the Standard Specifications do not provide guidance for particular types of fences, gates, monuments, railings, walls, sound walls, bollards, and other fence like appurtenances the design shall provide adequate enough specifications as to materials, finishes or sealers, and workmanship that the best the "industry" can provide will ensure longevity, ease of maintenance and resistance to vandalism. Reference shall be given to California Landscape Standards by the California Landscape Contractors Association as well as other notable industry publications to determine what industry standards are.

6.1.5 Property Lines and Monuments - Any public fencing fronting a major traffic artery shall be considered a public fence and is to be placed on the public controlled side of any right of way/property or easement line. The Engineer shall determine which roadways are major traffic arteries through developments. Any other fence considered to be public in nature shall also be placed on the public controlled side of such lines. Private fences shall be located within the private side of such lines. The entire fence structure, including footings and drainage, shall be located entirely on the appropriate side of the right of way/property or easement line. Specific instructions shall be included in plans and specifications for any fencing operations to diligently protect and keep clear to view all property markers and monuments.

6.1.6 Traffic Protection - No fence, or related structure, shall be located in such a way as to obstruct clear line of sight for traffic safety. The location of such structures on corners must be confirmed with the Engineer. No gate shall be located in such a way that it can swing out into the path of pedestrian or vehicle traffic. A gate shall be set back in such a way that a parked vehicle will not protrude into the path of traffic while the gate is being unlocked and opened. Signage and reflectors shall be affixed to gates and fences as the location may require. Required signage may pertain to, but not be limited to, restrictions on trespassing, dumping and motorized access as well as information about habitat or trail routes. Gate design shall account for the height, width, materials and finishes to accommodate expected traffic use.

6.1.7 Locks - Where access at gates must be controlled gate hasps, drop bolts or other latching mechanisms must be able to fit a common keyed lock provided by the City. Where other agencies, contractors or utilities require access such mechanisms shall accommodate looped or otherwise multiple locking systems. At no time can the Engineer be locked out of a public gate.

SECTION 7. TRAFFIC SIGNALS

7.1 General

7.1.1 Scope of Work

- 7.1.1.1 Remove, install, and modify traffic signal systems, intersection safety lighting, and street lighting system as shown on the plans. The work of this section shall include all labor, materials, and equipment necessary to complete all installations required to deliver fully operational traffic signal and lighting systems, including interconnect and central control system database, in accordance with the contract documents. (To the consultant) Provide a description of the scope and delete information that is not needed.
- 7.1.1.2 Traffic signal work is to be performed at the following locations. (To the consultant) Provide a description of the project here.
- 7.1.1.3 The Contractor shall be responsible for delivery of a fully operational system(s) and project as shown on the plans and as specified herein.

7.1.2 Plans and Specifications

- 7.1.2.1 Except as otherwise provided in these Special Provisions, work in this section shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the State Standard Specifications dated May 2006 and the State Standard Plans dated May 2006, and the most recent City Standard Details and Specifications, and shall be applicable for any work to be performed within the public right-of-way.

7.1.3 Order of Work

- 7.1.3.1 The first order of work shall be to contact underground service alert (USA) and identify proposed location of poles prior to placing the order for the traffic signal equipment (see section 1.04 Submittals). After the City has approved the signal pole locations, the Contractor can place the order. The Contractor shall furnish the Engineer with a statement from the vendor that the order for said equipment has been received and accepted by said vendor.
- 7.1.3.2 The Contractor shall apply for and obtain any permits necessary to complete this project. An encroachment and excavation permit from the City will be required depending on the project. If the improvement is a capital improvement project there will be no fees; however, for development improvements the City requires that all fees be paid in advance.
- 7.1.3.3 All applicable fees including inspection fees, and the bond costs, related to the permits shall be considered as included in the contract price paid for the

various items of work involved and no additional compensation will be allowed therefore.

- 7.1.3.4 All detector loops shall be cut in the uppermost layer of new pavement. Hot melt rubberized sealant shall be used after first cleaning and blowing all particulate matter and liquids. The waste material shall be captured and handled according the current City requirements and in compliance with the storm water pollution prevention plan (SWPP). No video detection is permitted unless it is authorized for temporary conditions to shift lanes.
- 7.1.3.5 Unless otherwise approved by the City Engineer, where the sidewalk is removed for the installation of conduits, pull boxes, poles or other work, it shall be re-poured within a week. Temporary or alternative access maybe approved by the Engineer only upon proper notification and traffic control to inform pedestrians, bicyclists, and motorists of new the route.
- 7.1.3.6 No above ground electrical work shall be performed on any system within the project site until all Contractor furnished electrical materials for the individual system have been tested and delivered to the Contractor. Work which uses processes, equipment, or materials which have not been approved is performed at the Contractor's own risk. Work performed utilizing rejected processes, equipment, or materials will be removed, repaired, or redone at the Contractor's expense to the satisfaction of the City.
- 7.1.3.7 The Contractor shall notify City of Vallejo Traffic Supervisor at (707) 648-4518 or his designee at least five (5) working days prior to performing any work on the existing signal and street lighting system.
- 7.1.3.8 Prior to commencement of the traffic signal functional test at any location, all items related to signal and lighting or electrical control shall be completed and roadside signs and all pavement delineation and pavement markings shall be in place at that location.
- 7.1.3.9 Work which uses processes, equipment, or materials which have not been approved is performed at the Contractor's own risk. Work performed utilizing rejected processes, equipment, or materials will be removed, repaired, or redone at the Contractor's expense to the satisfaction of the City.
- 7.1.3.10 The Contractor is required to submit a traffic control plan prior to beginning any work. The plan shall include all applicable signs according to the current California Department of Transportation Manual of Uniform Traffic Control Devices (CAMUTCD) standard including any tapers, signs, striping, or delineation. Lane widths less than 11 feet are not allowed without the permission of the City Engineer.

7.1.4 Submittals

7.1.4.1 Unless discussed elsewhere in these technical specifications, the Contractor shall allow 14 working days from the time the documents are received for the Engineer to review all product submittals. The Engineer will indicate in writing on the submittal whether it is approved or denied. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the submittal and shall allow an additional 14 working days from the time the equipment was resubmitted for the Engineer to review the revisions. If any of the Engineer's comments made on the first review are not addressed in the second or subsequent submittals, the Contractor will be charged for the time the Engineer spends reviewing the submittal at the Engineer's current rate with applicable overhead. Submittal equipment shall include but not limited to:

- Pull boxes
- Controller type
- Cable, conductors/wire interconnect
- Poles
- Light fixtures
- Pedestrian push buttons
- Audible pedestrian indications
- Optical/cable
- In-pavement light system
- Ground rod
- Conduit
- Hot meter rubberized sealant
- Water based lubricant
- Pedestrian signals
- Vehicle signals
- Hardware
- Back plates
- Service enclosure/battery back-up
- Wireless detection

7.1.5 Obstructions

- 7.1.5.1 The Contractor shall check the depth and alignment of sanitary sewer (SS) and storm drain (SD) lines prior to crossing over them. The verification can be done by checking manhole and curb inlets on site and the location of District SS cleanouts.
- 7.1.5.2 If any laterals of the SS and SD lines are excavated under or broken, a separate encroachment permit shall be obtained and paid for by the Contractor.
- 7.1.5.3 Pull boxes, signal poles, and cabinets shall not be placed over SS and SD facilities. A minimum horizontal separation with a minimum of 1 foot and maximum of 2 feet shall be maintained.
- 7.1.5.4 Conduit runs shall not be placed longitudinally over SS and SD lines. A minimum horizontal separation minimum of 1 foot and maximum of 2 feet shall be maintained.

7.1.6 Maintaining Traffic

- 7.1.6.1 The Contractor shall notify the Engineer, Caltrans (if necessary), local authorities, and emergency communications at (707) 648-4448 of the intent to close a roadway or a portion of the roadway at least 5 days before work is to begin. At any time, if the City deems necessary based on traffic conditions, a changeable message sign may be requested to properly inform motorists in advance of the closure at no cost to the City. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make his own arrangements relative to keeping the working area clear of parked vehicles.

7.1.7 Hours of Work

- 7.1.7.1 Regular working hours are 8:00 a.m. to 4:30 p.m., Monday through Friday, excluding holidays observed by the City. The Contractor shall obtain the Engineer's approval for all work outside these working hours. No lane closures are permitted before 9:00 and after 3:30 or holidays without notifying the Engineer.
- 7.1.7.2 All inspection work and equipment usage outside the regular working hours as described above or beyond 8 hours per day on any particular job, shall be charged to the Contractor at each inspector's current overtime and vehicle rates with applicable overhead.

7.1.8 As-Built Drawings

- 7.1.8.1 The Contractor shall provide and keep up to date a complete set of record drawings. Such drawings shall fully represent installed conditions including actual locations of all underground site utility and interconnect conduits. The Contractor shall record all changes in the work during the course of construction on black line prints. All changes shall be neatly and legibly drawn to scale on the set of prints using standard architectural or engineering drafting practices. A list of the serial number and model of the equipment used at each location shall also be kept. After completion of the job, the as built plans and specifications shall be delivered to the Engineer in both full size hard copy and an electronic format in AutoCAD version as approved by the Traffic Engineer.

7.2 Cost Breakdown

(To the consultant) Include this section for CIP projects.

- 7.2.1.1 The Contractor shall furnish to the Engineer a cost breakdown conforming to section 86-1.03, "Cost Breakdown," of the Standard Specifications for each contract lump sum item of work of this project.
- 7.2.1.2 The cost breakdown shall be submitted to the Engineer for approval within 15 days after the contract has been approved. The cost breakdown shall be approved, in writing, by the Engineer before any partial payment for the items of work will be made.
- 7.2.1.3 The cost breakdown shall, as a minimum, include the following items:

- Controller assembly

- Service equipment enclosure

- Foundations - each type

- Traffic signal standards and poles - each type

- Conduit - each size and installation method

- Pull boxes - each type

- Conductors - each size and type

- Signal interconnect cable

- Vehicle signal heads and hardware - each type

- Pedestrian signal heads and hardware - each type

- Pedestrian push buttons - each type

- Accessible pedestrian signals - each type

- Loop detectors - each type

- Alternative loop detectors (Sensys) - each type

- Luminaires or LED luminaires- each type

- Emergency vehicle detection system - each type

- LED internally illuminated street name sign - each type

- Detector handhole - each type

- In-pavement warning lights (IRWL) - each type

7.3 Execution

7.3.1 Maintaining Existing and Temporary Electrical Systems

- 7.3.1.1 Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 a.m. and - 3:00 p.m., Tuesday through Thursday, excluding City holidays, the day after City holidays, or during rain unless otherwise approved by the City. The same hours shall apply to signal turn-ons however they shall not begin after 1:00 p.m. All detectors shall be operational, striping or markings and signs in place prior to the turn on. With prior approval by the City Engineer, signals will be allowed to be put on red flash the day before the scheduled turn-on.
- 7.3.1.2 Existing traffic signals shall remain operational until the day of the turn on of the new signal system. Where an existing traffic signal is to be modified, the Contractor shall maintain at least two (2) indications per direction per movement according to the CAMUTCD until the day of the final switch over, unless otherwise approved by the Engineer. Any damage done to an existing signal by the Contractor shall be repaired within 24 hours, to the satisfaction of the City, except as stated in the following paragraph.
- 7.3.1.3 If any part of the detector conductor, including the portion leading to the adjacent pull box, is damaged by the Contractor's operations, the entire detector shall be replaced within 48 hours, unless the Contractor is currently working on signal improvements at the affected location, in which case the loop must be replaced within two weeks. If the detector is to be replaced, it may be temporarily spliced, if the work is to be completed within 3 months, with City's approval prior to the new loop being installed. However, any failure of the detector is the ultimate responsibility of the Contractor to repair or replace. If any adjacent detector is damaged during such replacement, that detector shall also be replaced. Upon final modification or replacement, all the hard wired detector loops shall have a resistance to ground of at least 500 mega-ohms. Documentation in the form of a letter certified by the Contractor shall be supplied to the City.
- 7.3.1.4 Existing lighting systems shall remain operational. In rare cases when lighting is not functional, temporary lighting can be provided if approved by the City Engineer.
- 7.3.1.5 At least three working days prior to performing any work on each existing system, the Contractor shall notify the City of Vallejo Traffic Supervisor at (707) 648-4518 or his designee.

7.3.2 Traffic Control System for Lane Closure

- 7.3.2.1 The Contractor shall submit a traffic control plan to the City Traffic Engineer or designee for approval prior to installation of any traffic control. No traffic control shall begin until the Contractor's traffic control plan is approved. A traffic control system shall consist of closing traffic lanes in accordance with details shown on the plans and CAMUTCD standards.
- 7.3.2.2 The provisions in this section shall not relieve the Contractor from the responsibility to provide such additional devices or take such measures as may be necessary to comply with provisions in Section 7-1.09, "Public Safety" of State Standard Specifications.
- 7.3.2.3 If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace said component and shall restore the component to its original location.
- 7.3.2.4 Each vehicle used to place, maintain, and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining, or removing components. Vehicles equipped with Type II flashing arrow sign shall not be involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining, or removing of components of a traffic control system, and shall be in place before a lane closure requiring its use is completed.

7.3.3 Standards, Steel Pedestals and Posts

- 7.3.3.1 Only a side tenon at the end of the signal mast arm will be acceptable.
- 7.3.3.2 All visible screws shall be theft proof.
- 7.3.3.3 Handholes for traffic signal standards shall be located 90 degree clockwise from the traffic signal mast arm and away from traffic.
- 7.3.3.4 Type 1 standards shall be assembled and set with the handhole on the downstream side of the pole in relation to traffic, or as shown on the plans and/or directed by the Engineer.

- 7.3.3.5 Upon the completed installation, the poles shall be stamped or bead welded at the base plate with the type and year of the specification. Any poles removed and salvaged from operation shall also be labeled prior to delivery to the corporation yard at 111 Amador Street, Vallejo CA 94590.
- 7.3.3.6 All signal standards shall have a minimum of 2 inches and a maximum of 4 inches of grout installed between the bottom of the base plate and the finished grade.

7.3.4 Trenching

- 7.3.4.1 Except as otherwise specified in the "CONDUIT" section, at locations where conduit is required to be installed under existing pavement, a City approved method that will not cause damage to the pavement shall be used. However, with advance approval by the Engineer and if delay to any vehicle will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method" as specified in Section 86-2.05C, "Installation," of the State Standard Specifications.
- 7.3.4.2 When the Trenching in Pavement Method is used, the outline of the area of pavement to be removed shall be cut with a power driven saw to a depth of not less than 4 inches in order to provide a neat and true edge with no shatter outside the removal area. If the trench is within 3 feet of a gutter edge, only one saw cut will be required (on the side of the trench opposite of the gutter) and the asphalt surfacing shall be replaced all the way to the gutter edge. A tack coat shall be applied to the vertical edges just prior to place the asphalt concrete used to cap the trench. The trench shall be filled with 4 inches of red-oxide slurry with safety tape.
- 7.3.4.3 Damage to pavement which is to remain in place shall be repaired to a condition satisfactory to the City Engineer, or the damaged pavement shall be removed and replaced with new asphalt concrete if ordered by the City Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's expense and will not be measured nor paid for.
- 7.3.4.4 Removed materials shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material outside the Highway Right of Way," of the State Standard Specifications. This material shall become the property of the Contractor. The Contractor shall be responsible for locating a suitable dump site approved by the City Engineer and for transporting the materials for dumping. When the material is to be disposed of at a location other than the local sanitary landfill site, the Contractor shall obtain written authorization from the property owner on whose property the disposal is to be made and he shall file said authorization with the City Engineer together with a written release from the property owner absolving the City from

any and all responsibility in connection with the disposal of material on said property. If the dump site is within the City limits, the property owner must obtain a grading permit.

- 7.3.4.5 Full compensation for securing a dump site, hauling, removing, disposing or stockpiling broken asphalt, concrete, base material and earth and for all other aspects of this section will be considered as included in the contract prices paid for the various items of work and no additional allowance will be made therefore.
- 7.3.4.6 If the Contractor elects to use "Directional Boring," the conduit shall be installed between a minimum depth of 24" to a maximum depth of 60" unless directed otherwise by the Engineer. Conduit installed by the Directional Boring Method will be paid for under the various contract bid items for installing conduit including trenching. (To the consultant) Verify with the City what approach to take - this is not an item that should be left to the Contractor to decide.
- 7.3.4.7 Directional Boring under railroad tracks shall be a minimum of 3'-6" below the railroad ties. No trenching will be allowed within the railroad right of way. The Contractor shall comply with all requirements set forth by the CPUC and other rail authority. (To the consultant) Verify with the City what approach to take - this is not an item that should be left to the Contractor to decide.
- 7.3.4.8 All existing signs in the way of the trenching operation in unimproved ground shall be salvaged and reinstalled or replaced per plan or as ordered by the Engineer. Each roadside sign shall be reset on the same day that the sign is removed. (To the consultant) Verify with the City what approach to take - this is not an item that should be left to the Contractor to decide.

7.3.5 Conduit

- 7.3.5.1 All conduits to be installed underground shall be Schedule 40 PVC rigid non-metallic type unless otherwise specified. There shall be no more than 180 degree in bends. An intermediate pull box can be installed to relieve the need for additional bends at the Contractor's cost. There shall be no empty conduit legs. Each conduit run shall include a #8 solid bond wire and traceable ¾ inch 2400# traceable pull tape. The pull tape shall be pulled into the conduit with the appropriate conductors, fiber optic, or signal interconnect cable. At least three (3) spare conductors shall be pulled into each signal conduit. The cost of this pull tape shall be considered to be included in the contract lump sum price for traffic signal and no further compensation will be made. All conduits shall include bell ends and duct sealed.
- 7.3.5.2 When rigid non-metallic conduit is placed in a trench (neither in pavement nor under portland cement concrete sidewalk), after the bedding material is placed and conduit installed, the trench shall be backfilled with commercial quality red

oxide concrete and warning tape, containing not less than 376 pounds of cement per cubic yard, to not less than 4 inches above the conduit before additional backfill material is placed.

- 7.3.5.3 Conduit runs shown on the plans to be located parallel and behind curbs may be installed in the street, within 3 feet of and parallel to the face of the curb, by the trenching in pavement method described in Section 86-2.05C of the Standard Specifications. All pull boxes shall be located behind the curb or at the locations shown on the plans.
- 7.3.5.4 After conductors have been installed, the ends of conduits terminating in pull boxes, and in service and controller cabinets shall include Bell Ends and be sealed with duct seal or an approved type of sealing compound.
- 7.3.5.5 At locations where conduit is required to be installed under pavement and existing underground facilities require special precautions, as described in "Obstructions" of these Special Provisions, conduit shall be placed by the "Trenching in Pavement Method" as specified in said Section 86-2.05C.
- 7.3.5.6 At other locations where conduit is required to be installed under pavement and if delay to any vehicle will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."
- 7.3.5.7 Communication conduits shall enter pull box from the side and at an angle not greater than 45 degrees from the horizontal.
- 7.3.5.8 Conduit bends of communication conduits shall have an angle of no greater than 45 degrees and a radius of no less than 24 inches.

7.3.6 Pull Boxes

- 7.3.6.1 All pull boxes placed in earth or planting strip with landscaping shall be set to grade and installed with a minimum 12 inch concrete collar by 4 inch thick and at least 4 inches along the sides of the pull box to the bottom edge. All pull boxes shall be theft proof with the installation method approved by the City prior to installation.
- 7.3.6.2 Grout shall not be placed in bottom of pull boxes. New $\frac{3}{4}$ " graded clean rock shall be used at the bottom of the sump. Any other debris in the bottom shall be removed by the Contractor at the time the project is accepted.
- 7.3.6.3 The third paragraph of Section 86-2,06C, "Installation and Use" of the Standard Specifications, is amended to read: Where the sump of an existing pull box is disturbed by the Contractor's operations the sump shall be reconstructed.
- 7.3.6.4 All pull boxes shall be No. 5 except where noted otherwise. For pull boxes with

3 or more conduits entering a No. 6 pull box shall be used. Where more than 4 conduits enter, the N48 (30-1/4" x 48-1/4") shall be used. For all sections of conduit with Fiber Optic or SIC cable, only No. 6 or larger pull boxes shall be used unless otherwise noted on the plans as indicated on the state standard plans.

- 7.3.6.5 No. 3-1/2 pull boxes shall not be used. Where Standard Plans indicate No. 3 1/2 pull boxes, the No. 5 pull boxes shall be used.
- 7.3.6.6 Cover marking shall be "CITY OF VALLEJO, COMMUNICATION" for any pull boxes that contain only Fiber Optics or Signal Interconnect Cable (SIC). Cover markings for pull boxes that contain signal conductors shall be marked "TRAFFIC SIGNAL." Street lighting pull boxes shall contain cover markings with "CITY OF VALLEJO, STREETLIGHTING." The lids shall be protected during the course of construction. Any damage to the pull boxes at the time the project is accepted shall be rejected and a new lid installed in its place.
- 7.3.6.7 Where pull boxes are to be installed over existing conduits that contain signal interconnect cable or fiber optic cable, care shall be taken so that the cable will not be damaged. Any cable that is suspected of being damaged shall be checked to verify there is no damage utilizing an optical Time Domain Reflectometer (OTDR). The Contractor shall supply a letter certifying the integrity and results. Damaged cable shall be replaced to the City's satisfaction at the Contractor's expense. Contractor will be required to make any repairs to allow for the required slack as identified in these Special Provisions.

7.3.7 Conductors and Wiring

- 7.3.7.1 Splices are not allowed; however, there are some cases when they are unavoidable and used for temporary solutions, typically between 3 and 6 months. As a result, spliced conductors shall be insulated by "Method B" per the California Department of Transportation Standard Details of May 2006 (ES-13A).
- 7.3.7.2 All new conductors in the controller cabinet shall be secured and clearly labeled.
- 7.3.7.3 The Contractor shall provide the Engineer a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all the conductors and cables furnished for the project.
- 7.3.7.4 In addition to the requirements for splices in detector circuits, the open end of cable jackets or tubing shall be sealed in a manner similar to the splicing requirements to prevent the entrance of water.

- 7.3.7.5 At least six (6) feet of slack shall be provided in all pull boxes located nearest the signal standards.
- 7.3.7.6 Where new conductors are pulled into a conduit which contains existing conductors, all conductors shall be removed and existing and new conductors shall be re-pulled together. If it is decided by the Engineer that the existing conduit cannot be removed due to down time of the traffic signal, the Contractor shall use an approved water based lubricant to pull in the new cable or conductors. All the conductors shall be meggered to verify the integrity of the conductors according to the previous sections in this special provision.
- 7.3.7.7 All unused conductors including signal interconnect cable (SIC) shall be terminated and neatly banded and appropriately labeled in the controller cabinet.
- 7.3.7.8 All conductors between the controller assembly and the service and all signal conductors shall be stranded THW.
- 7.3.7.9 Designated Cable Slack - Throughout the cable plant the Contractor shall be required to pull and store excess cable slack at designated intervals. These intervals shall be at each communications pull box, and each hub or controller. The following lengths of slack cable are the minimum City requirements:

No. 6 Pull Box	6 feet
Controller	20 feet
Communication	6 feet
- 7.3.7.10 Signal cable shall not be used.
- 7.3.7.11 All wiring shall be connected to a terminal strip and neatly tie wrapped. No wiring shall hang loose.
- 7.3.7.12 All fuses to be located in mast arm poles and not inside of pull boxes.

7.3.8 Signal Interconnect Cable (SIC)

- 7.3.8.1 The SIC shall be specified as BSCC-HDPE-12P 20 AWG-300V-60C, has 12 pairs of #20, stranded, tinned, copper conductors. Alternative shall be Rural Electrical (REA) PE-22. In either case, both types shall meet the Caltrans standard specification for interconnect cable. Each pair has a conductor insulated in black. The other conductor is insulated in color; a different color for each pair. Each pair is shielded and individually wrapped such that the shields are insulated from one another.

- 7.3.8.2 Throughout the cable plant the Contractor shall be required to pull and store excess cable slack at designated intervals. These intervals shall be each communication pull box, and each hub or controller. Six (6) feet of slack shall be stored at each pull box and twenty (20) feet of slack at main pull box adjacent to each hub or controller cabinet.
- 7.3.8.3 The existing 24-strand fiber optic cable to be cut shall NOT be spliced. Under temporary conditions, fiber optic cable can be spliced by the industry "fusion method," unless the Contractor recommends another method that is acceptable and approved by the City Engineer. Once the temporary splice is completed, the fiber shall be tested for loss. Any loss greater than 0.25 db shall be re-spliced or a new fiber re-pulled into the conduits. Written verification is required by the Contractor certifying the integrity of the cable.
- 7.3.8.4 SIC cables shall be secured to the frame of the controller cabinet. Terminate SIC cable on terminal strip. Install a patch cable between the terminal strip and the lightning protection, and between the lightning protection and the modem. Crimp and solder all SIC and patch cable lugs. The cable shall be taped where the sheathing ends.
- 7.3.8.5 New SIC conductors may be pulled in without removing the existing SIC and/or fiber optic cable when the conduit only contains SIC or fiber optic cable.
- 7.3.8.6 At the controller cabinet blue-black and red-black are the pairs being used. The other pairs will be spare and tie wrapped accordingly for future use. The end of each wire is stripped, lugged, crimped and soldered with 60/40 rosin core solder, heated with no flame source. Each lug is then screwed to the terminal strip. The two shield wires are soldered together and earth grounded at one end of the cable only. The end closes to the hub.

7.3.9 Service

- 7.3.9.1 (To the consultant) New services will contain battery back-up system (BBS). See section 3.09A and delete this section if not needed.
- 7.3.9.2 Continuous welding of exterior seams in service equipment enclosures is required.
- 7.3.9.3 New Type III service equipment enclosures shall be the anodized aluminum type.
- 7.3.9.4 All overlapping exterior seams and doors shall meet the requirements for Type 3R enclosures specified in the NEMA Enclosure Standards.
- 7.3.9.5 All multi-pole circuit breakers shall be the internal trip type.

- 7.3.9.6 All traffic signal circuits shall be metered. All street lights shall be un-metered flat rated.
- 7.3.9.7 Service shall be a Tesco Type III BF service (Ref. T-17162) or approved equal.
- 7.3.9.8 Two contactors and two photoelectric units are required (for lighting and LED IISNS).
- 7.3.9.9 Circuit breakers shall be the cable-in/cable-out type, mounted on non-energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the "ON" position.
- 7.3.9.10 Dead front panel or panels, and corresponding exterior door shall be hinged on one side and shall be able to be opened without the use of tools.
- 7.3.9.11 A barrier type terminal block rated for 40A, minimum shall be provided in each service equipment enclosure. The terminal block shall have a minimum of 12 positions with terminals rated at Size No. 8 or larger, to accept the field wires indicated on the plans. Field wires shall be terminated on the ground/neutral breaker bar.
- 7.3.9.12 Conduits entering the service cabinet shall be sealed with an approved sealant.
- 7.3.9.13 Photo electric unit used in the street light circuit in the cabinet shall be time delay.
- 7.3.9.14 Duct seal shall be used at the base of the service cabinet.

7.3.10 Service Equipment

- 7.3.10.1 The Contractor shall furnish and install the service equipment cabinet and battery back-up system (BBS) as shown on the signal plans and as provided in these standard provisions. It shall be located at least 6 feet from the controller assembly with the meter facing the roadway. The service equipment shall be a TESCO TRAFFIC 27-000/22 BBS 1400XL-6 or equal.

- 7.3.10.2 Service Enclosure: The service enclosure shall:

- Be 20" wide X 50" high X 10 ¼" deep

- Meet EUSERC requirements

- Include Type V PEU

- Be fabricated from ⅛" aluminum

- Be fabricated from 14 gauge cold rolled steel, painted white

Be anodized aluminum

Have continuous welded seams

Have full length dead front with stainless steel hinge

Be a UL 508 industrial control panel label for service entrance equipment

Have section with removable step

Have fully framed side hinged outer door with swaged close tolerance sides for flush fit with top drip lip and closed cell neoprene flange compressed gaskets

Have hinged dead front with ¼ turn latch & knurled knobs

Have core mortise lock with 2 - #2 traffic signal key provided

Have dead front door hinged on the same side as exterior door & open a minimum of 100°

Have removable back panel mounted on 4 welded ¼" studs

Have all circuit breakers mounted in a vertical position, handle up for "ON" handle down for "OFF"

Have circuit breakers of cable-in cable-out type

Have service enclosure shall consist of absolutely no "Bolt-On" or "Plug-In" circuit breakers

Have service enclosure completely prewired in the factory

Have wiring to NEMA IIB standards showing external connections and external equipment

Have all bussing UL approved copper THHN cable bussing, fully rated

Have all circuit breakers, switches and other components function as required

Be identified by laminated engraved plastic nameplates with minimum ¼" letters

Be fastened with minimum of two #4-40 stainless steel machine screws

Have Computer Aided Drafting (CAD) wiring schematics and include all external equipment and connections per NEMA IIB.P8

Have As Built factory drawings enclosed in clear plastic and held inside the outer door by welded hooks

Have manufacturer furnish independent laboratory certification of metal preparation and finish and confirmation that the overall product meets these specifications

If this agency wishes to witness this testing, all costs are to be paid by the Contractor.

7.3.10.3 Battery Backup System

- 7.3.10.3.1 The battery backup system cabinet shall be anodized aluminum weatherproof enclosure and shall house BBS and batteries. The enclosure shall be TIG welded construction with welding materials specifically designed for the material to be welded. The BBS enclosure shall have fully framed side hinged outer doors with swaged close tolerance sides for flush fit with drip lip and closed cell neoprene flange compressed gaskets.
- 7.3.10.3.2 The front door shall incorporate a full-length piano hinge, pad-lockable draw latch (center area on door-latch side), and two pad lockable welded-in place vandal-proof tabs (one upper area, one lower area on door-latch side, rated at 2000 lbs. each). There shall be no exposed nut, bolts, screws, rivets or other fasteners on the exterior of the enclosure. The maximum cabinet dimensions 46" H x 20" W x 10.25" D with a weight of 250 lbs with the batteries. The BBS shall be mounted in an interior tilt out housing with 800 lb rated stops.
- 7.3.10.3.3 Battery connectors shall be Anderson Connectors with silver plated contacts. The batteries shall be installed in fixed position framed trays for seismic safety and be readily accessible for maintenance. The batteries shall be mounted allowing airflow front and back. The BBS enclosure will include two transfer bypass switches, one for BBS bypass the second for auxiliary generator (optional). All the switches shall be panel mounted on interior dead front panel board. UV resistant plastic laminated nameplates shall identify all controls and major components. A plastic covered wiring diagram will be attached to the inside of the front door. All components shall be factory wired and conform to required NEMA, NEC, and UL standards. A chassis ground point shall be provided. Panel shall be UL 508 Industrial Control Panel rated.
- 7.3.10.3.4 BBS Panel: The BBS panel shall include the following minimum specifications:
- System shall provide 700 watts of full control run time for two (2) hours. In addition the system shall provide six (6) to eight (8) hours of flash.
- BBS bypass and BBS isolation switch.
- Deadfront safety panel board with all switches, indicating fuses, plugs, and isolation fuses for each battery pre-wired with phenolic nameplates.
- All nameplates shall be screwed on phenolic engraved type.
- All wire terminating lugs shall be full wrap around type.
- All batteries shall be captive spaced from external captive sides in

earthquake proof buckets.

Cabinet ventilation shall be by (qty. 2) 4" x 1/4" louvers top and bottom with encapsulated bug screens, cleanable filters and a 100cfm fan to completely exchange air 25 time minimum per minute.

All DC terminals and connections shall incorporate safety covers such that the safety covers are in place for every normal maintenance mode.

Event counters and total run time counter.

7.3.10.3.5 BBS Unit: The BBS units shall include these minimum specifications.

The BBS unit shall provide a true sine-wave output with minimum 1400 Volt-Amp continuous capacity.

The BBS shall provide for utility service isolation when in operation.

The minimum rating for wattage output will be 950 watts.

The BBS shall be capable of running an intersection with LED lights (for run time consult manufacturer).

The unit shall operate off-line, with transfer time of 2 ms or less, with battery condition indicator, with automatic test provisions, and with hot-swappable batteries (all batteries in system).

The BBS will automatically recharge batteries from full discharge to 95% capacity within 6 hours.

The BBS shall provide on-line operation for a minimum input of 92 to 145 VAC.

The BBS shall provide full load output of 120VAC – 10% / +4% at 60 Hz +/- 0.05% over a temperature range of -37° C (optional adder) to +74° C.

The BBS shall be a UL Approved Design.

7.3.11 Model 170 Controller Assembly

7.3.11.1 The Contractor shall contact the City Engineer, at least 48 hours in advance, to schedule the date and time for switch over so the City can arrange to have a qualified personnel on hand to revise the timing parameters for proposed signal phasing operation.

7.3.11.2 Controller shall be type 170 ATC (HC11CPU) with 4 communication ports. A model 400 modem shall be included in each new controller assembly. If two (2) or more intersections are being installed or modified as a part of this contract, one (1) spare modem shall be supplied.

7.3.11.3 All boards in the 170ATC type controllers shall be of socket type design allowing individual chips to be easily removed and replaced.

- 7.3.11.4 The Contractor shall arrange to have a signal technician through the inspector, qualified to work on the controller unit and employed by the controller unit manufacturer or his representative, present at the time the equipment is turned on.
- 7.3.11.5 The operating program for Model 170 controller unit shall be supplied by the Contractor and shall be fully populated with the latest BI Trans systems, Inc. 233 program. One (1) additional 233 program chip with the latest Bi Tran Systems program shall also be furnished by the Contractor.
- 7.3.11.6 Each 332 controller cabinet assembly shall be delivered to the City of Vallejo Maintenance Division at 111 Amador Street, Vallejo CA 94590 and tested for 35 days prior to installation. The Contractor will be notified upon completion of the testing and shall then arrange for delivery of the controller assembly to the site of the work. The costs of such testing and transportation and to and from the Maintenance Division shall be borne by the Contractor.
- 7.3.11.7 The conflict monitor unit shall monitor 16 channels and each shall have its own indicator.
- 7.3.11.8 An open door sensor shall be provided in the controller cabinet.
- 7.3.11.9 All terminal strips on new and existing cabinet shall be accessible when the cabinet is fully assembled.
- 7.3.11.10 Contractor shall obtain approval from the City for the location prior to installation of the controller assembly.
- 7.3.11.11 The Contractor shall give the City of Vallejo five (5) working days notice prior to a system turn-on.
- 7.3.11.12 The bottom of the controller cabinet shall be duct sealed.
- 7.3.11.13 All wiring shall be connected with any loose wire ties wrapped to a terminal strip. No wiring shall hang loose.
- 7.3.11.14 There shall be a pull out table type tray mounted beneath the controller for storing of prints and other important information.

7.3.12 Vehicle Signal Faces and Signal Heads

- 7.3.12.1 All lamps for traffic signal units shall be furnished and installed by the Contractor. The products qualified for use in the City shall be either Dialight or Gelcore GT1 with incandescent look light emitting diode or equal. Only 12" circular arrow or ball shall be used on new or retrofitted traffic signals. Any alternate shall be

submitted to the Engineer for approval.

- 7.3.12.2 In addition to 3.11, all green, yellow, and red signal sections shall be Light Emitting Diode (LED) type conforming to Section 86-4.02, "Light Emitting Diode Signal Module," of the State Standard Specifications.
- 7.3.12.3 The designer is responsible for verifying that the mast arm lengths that are listed in the Equipment Schedule provide optimal visibility and clarity for drivers.
- 7.3.12.4 In cases where poles and arms must be installed in front of existing poles and arms, the Contractor shall assure that there are at least two indications in full view of approaching vehicles per each phased movement.
- 7.3.12.5 Type SV-1-T mountings with 5 sections and SV-2-TD mountings shall be bolted to the standard through the upper pipe fitting in a manner similar to the terminal compartment.
- 7.3.12.6 Terminal compartments shall be bronze.
- 7.3.12.7 The backplate shall be one-piece, louvered, and removable while the signal is in operation.
- 7.3.12.8 Where existing heads are being reused, new gaskets should be installed.
- 7.3.12.9 The manufacturer shall provide a written warranty against defects in materials and workmanship for LED signal modules for a period of 60 months (5 years) after installation of LED signal modules. Replacement LED signal modules shall be provided within 5 days after receipt of failed LED signal modules at no cost to the City, except the cost of shipping the failed modules. All warranty documentation shall be given to the Engineer prior to installation. Replacement of LED signal modules shall be delivered to the City of Vallejo.
- 7.3.12.10 Two (2) spare circular red, green, and yellow ball and arrow indications shall be supplied with each intersection.

7.3.13 PEDESTRIAN SIGNALS

- 7.3.13.1 Type SP-1-T mountings shall have a lower mounting bracket attached to the pedestrian signal housing in the same manner as the SP-2-T mounting.
- 7.3.13.2 All pedestrian signal faces shall be Light Emitting Diode (LED) countdown type conforming to Section 86-4.07 "Light Emitting Diode Pedestrian Signal Face "upraised Hand" Module," of the Standard Specifications, and shall be listed on the current Pre-Qualified Products List Maintained by Caltrans.
- 7.3.13.3 Pedestrian signal units shall be Gelcore, Dialight, or approved equal

countdown type with hand/man filled with LEDs. No hand/man outlined LEDs will be allowed. The countdown feature is only allowed to countdown the flashing "Don't Walk" per the CAMUTCD.

- 7.3.13.4 The Contractor shall provide the City a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-1.07 "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the LED pedestrian modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the LED pedestrian modules.
- 7.3.13.5 LED pedestrian modules shall be guaranteed by the Contractor for a period of five years starting on the day after the project is accepted by the City. Modules that fail during this period shall be removed and replaced by the Contractor at no cost to the City.
- 7.3.13.6 One (1) spare LED pedestrian signal module shall be provided with each intersection.

7.3.14 Detectors

- 7.3.14.1 Loop detector lead-in cable shall be Type B.
- 7.3.14.2 Detector card shall be back lit LCD digital readout capable of detecting all status and function settings. The unit shall be capable of audible detect for loop and detector troubleshooting. Programmed detector parameters shall be stored in non-volatile memory. The unit shall be downward compatible. The LCD screen shall read out real-time loop frequency, loop inductance, a bar graph indication of relative inductance change, record of accumulated loop failures, and a timer countdown of programmed timing functions.
- 7.3.14.3 All detector cards shall be delivered to the City of Vallejo Maintenance Division for testing. Ten percent (10%) of the cards will be tested to determine if they miss calls at an average sensitivity or if they "lock up" at high sensitivity. If it is determined that a significant portion (10%) of the tested detectors cards fail this test, the brand of detector cards will be rejected for use in the project and a different brand shall be submitted.
- 7.3.14.4 Where loops are to be installed partially in concrete, the installation of the detector shall be installed in such a manner as to provide a coupled Schedule 40 PVC expansion fitting to allow flexing and differential settlement of two pavement types.
- 7.3.14.5 Where loops are cut into the top lift of the flexible or rigid pavement, an approved hot melt rubberized asphalt sealant according to section 86-5.01A(5) of the State Standard Specifications shall be used.

- 7.3.14.6 The traffic loops homeruns shall be twisted then spliced to the lead in cable in the pull boxes. Splices shall be soldered using rosin core 60/40 (tin to lead ratio) solder. The heat source shall be without flame. Each splice is first wrapped with rubber splicing tape then electrical tape. The tape is then covered with liquid scotchkote for the final seal.
- 7.3.14.7 Loop wire shall be Type 2.
- 7.3.14.8 A Modified Type E Loop shall be used at the stop bar **(To the consultant) See City Standard Detail 3-46**. The remaining loops shall be Type E per Caltrans Standard Plans. The sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 1 1/2 inches. Slot width shall be a maximum of 3/4 inch.
- 7.3.14.9 Detector loops shall be installed on top of the upper most lift of pavement so that they are visible. Replacement of the pavement shall conform to Section 0930, "Asphalt Concrete Paving and Related Work," of the Technical Specifications.
- 7.3.14.10 One (1) additional detector card shall be supplied with each intersection being modified or of new construction.

7.3.15 Alternative Detection for Private Drives

- 7.3.15.1 Alternative detection for private drives to be approved by Traffic Engineer.

7.3.16 Pedestrian Push Buttons

- 7.3.16.1 The pedestrian push button shall be Type A with directional color symbols identifying the meaning of the walk and don't walk symbols. The push button shall be Dick Campbell DCC 200 or equal with micro-switch.
- 7.3.16.2 Pedestrian push button housing shall be mounted with the actuator button at 3 feet above the adjacent finished sidewalk or pavement grade, or as directed by the Engineer.
- 7.3.16.3 The actuator surface of all pedestrian push buttons shall have a diameter of 2 inches or greater, shall meet all ADA standards and shall be made of stainless steel.
- 7.3.16.4 Screws use on pedestrian push button signs shall be theft proof and the removal tool shall be provided to the City of Vallejo by the Contractor.
- 7.3.16.5 Push button housing shall be metal.

7.3.16.6 Pedestrian push buttons shall be Type B with appropriate signs that meet ADA standards.

7.3.16.7 One (1) spare unit shall be supplied with the project.

7.3.17 Audible Pedestrian Signals (APS)

7.3.17.1 APS signal indications shall be supplied with the intersection, but not installed unless specified in the plans. A spare unit shall be supplied with each intersection. **(To the consultant) Determine from City whether the APS units will be installed as well as what type is to be supplied - the consultant will need to verify what will be required for the project.**

7.3.17.2 APS Standalone: A Novax DS100 or equal shall be supplied with the project for all directions as supplied by WP Signal. The units shall be capable of providing cuckoo/chirp chirp customizable for recorded voice message with dynamic voice volume compensation. The dynamic proportional volume compensation shall monitor ambient noise level and adjusts output to ensure audibility of signal. The units shall be mounted directly above the pedestrian indication.

7.3.17.2.1 Electrical: 4 wires 20 gauge (120 VAC from pedestrian indicator)

7.3.17.2.2 Power: 115VAC ±20VAC, 60Hz, 3 Watts

7.3.17.2.3 Transient Protection: Common mode; fuse

7.3.17.2.4 Dimensions: cm: 13L x 10W x 13H (5" x 3.75" x 5")

7.3.17.2.5 Output: Infinitely adjustable from 0 to 90 dB @1 meter

7.3.17.2.6 Output self-adjusts to +5 dB above street noise level, up to a maximum of 90 dB

7.3.17.2.7 Color: Standard grey dry powder coated; other colors customer specified

7.3.17.2.8 Temperature: Operational from -37°C to +74°C (-35°F to +165°F)

7.3.17.2.9 Enclosure: Weather-proof housing; external adjustments - no dismantling required

7.3.17.2.10 Loudspeaker: Water proof, UV resistant, vinyl impregnated cloth

7.3.17.2.11 Mounting: Positive lock heavy-duty swivel

7.3.17.2.12 Weight: Approximately 0.3 Kg (0.75 lbs)

- 7.3.17.3 APS Audible and Pedestrian Enclosure: The City has the option of requesting the Navigator or equal for unique highly pedestrian oriented locations. The units shall be self contained with vibro-tactile ADA compliant 2" push button with a raised directional arrow and audible sounds during all pedestrian cycles. Sounds shall be emitted out from behind the unit via a recessed weatherproof speaker. A custom voice-on-location message shall be provided with an extended push of the button. The message shall give information about the intersection and street being crossed. These additional features shall be included: **(To the consultant) Please remove this section if it does not apply.**
- 7.3.17.3.1 Independent minimum & maximum volume settings for locate sounds, clearance sounds and walk sounds
 - 7.3.17.3.2 Extended button push and volume overrides under logic control
 - 7.3.17.3.3 Global configuration changes
 - 7.3.17.3.4 Clearance sounds or audible countdown of remaining seconds during clearance; complements or replaces visible countdown displays
 - 7.3.17.3.5 Secure configuration
 - 7.3.17.3.6 System can self-test and fault report to a remote site for real-time monitoring and system maintenance
 - 7.3.17.3.7 Button rated for 100 million+ operations with > 2 lb. actuation force
 - 7.3.17.3.8 User selectable multiple language support option available; can be programmed with up to three pedestrian selectable languages
 - 7.3.17.3.9 Maximum volume dynamic range 60 dB
 - 7.3.17.3.10 Announcement of direction of travel (ex: "traveling west") can be added (in field) to location message
 - 7.3.17.3.11 Extended push priority (mutes entire intersection except selected crosswalk to minimize confusion caused by other sounds)
 - 7.3.17.3.12 Synchronized sounds throughout intersection; reduced noise clutter
 - 7.3.17.3.13 All inputs and outputs optically isolated that eliminates pedestrian button isolators

- 7.3.17.3.14 Provide special messages throughout intersection such as "Emergency vehicle approaching, please clear intersection immediately," or a similar warning message regarding an approaching train if desired
- 7.3.17.3.15 Push button failures or system failures default to transmitting a constant pedestrian call; standard pushbuttons can fail open
- 7.3.17.3.16 Adjustable extended push time from 1 to 4 seconds in .5-second increments can be set by installer
- 7.3.17.3.17 One (1) additional pole-mounted navigator unit shall be supplied with the project

7.3.18 LED INTERNALLY ILLUMINATED STREET NAME SIGNS

- 7.3.18.1 Internally illuminated street name signs shall be light emitting diode (LED) back lit/edge-lit internally illuminated street name signs.
- 7.3.18.2 The outer dimensions of the sign assembly (excluding the mounting bosses) shall be a width of 18 inches, and standard lengths of 72 inches or 96 inches depending on the length of the street name.
- 7.3.18.3 The maximum thickness of the sign shall be 1.38 inches for single sided signs, and 1.77 inches for double-sided signs.
- 7.3.18.4 The long edges of the sign shall be made from a single section of 6063-T5 aluminum extrusion. The ends caps shall be affixed to the frame with stainless screws. The end caps shall be removable to enable replacing panels and components.
- 7.3.18.5 The overall weight, excluding mounting hardware, shall not exceed 6 pounds per square foot for single sided signs, and 8 pounds per square foot for double sided signs.
- 7.3.18.6 Minimum luminance of the sign legend shall be 250 nits (candela/square meter). Minimum luminance of the sign background shall be 25 nits (candela/square meter). Sign elements to be illuminated shall include the sign legend and background, per CAMUTCD Section 2A.08.
- 7.3.18.7 The light source for the sign shall be LEDs (light emitting diodes) that are mounted along the top and bottom edges of the sign. The LEDs shall evenly illuminate a light panel that is the same dimensions of the sign face. The LEDs shall have a minimum projected life of 50,000 hours. A maximum of two LEDs per square foot shall be used for single sided signs, and four LEDs per square foot for double sided signs.

- 7.3.18.8 The power supply shall be housed inside the sign frame assembly. Power supply shall be UL Class 2 limited output voltage and current plus isolation for safe operation, and UL Outdoor damp location rated. Power supply shall be IP66 Outdoor Rated.
- 7.3.18.9 The vertical support bars shall be constructed from galvanized steel in lieu of aluminum and shall be Zap brackets or as approved by the Engineer. As an alternative, another bracket, the Bigfoot, can be provided as long as a safety cable is mounted from the sign to the pole. **(To the consultant) Prepare a detail of either the Bigfoot or Zap bracket using a safety cable and verify with Public Works or Maintenance.**
- 7.3.18.10 Product must be guaranteed for a minimum of three (3) years.
- 7.3.18.11 IISNS shall be installed on traffic signal mast arm min. of 15 feet from top of pavement to bottom of IISNS and to the right of the furthest right traffic signal head so that IISNS is clearly visible. If the minimum clearance and position cannot be met, IISNS shall be installed on IISNS support arm per City Standard Detail 3-48.

7.3.19 Light Emitting Diode (LED) Street Lighting and Intersection Safety Lighting

- 7.3.19.1 The Contractor shall supply LED street lighting fixture manufactured by Beta. If an alternative is submitted it must be provided prior to the bid. Fixture housing is all aluminum construction. Standard fixture utilizes terminal block for power input suitable for #6 AWG wire and operates at 525mA. Drive current is field switchable on 20 and 30 LED units. The appropriate wattage according to the plans shall be provided. The unit shall be warranted for a period of 5 years with 10 years on the paint and finish with a life rating of at least 50,000 hours.
- 7.3.19.2 Luminaire Efficiency: Allow for thermal and optical losses. Initial delivered lumens less thermal losses should be less than 10% when operated at a steady state at an average ambient operating temperature of 25°C, and optical losses should be less than 15%.
- 7.3.19.3 Depreciation: Average delivered lumens over 50,000 hours should be minimum of 85% of initial delivered lumens.
- 7.3.19.4 Light Distribution: Specify light distribution required and IESNA luminaire classification (LCS). Luminaire to have independent photometric test reports.
- 7.3.19.5 Maximum System Wattage (including driver loss): Calculate delivered lumens/total wattage. This provides a timeless specification. If LED lumens/watt increase between the time of specification and the time of product ordering you will either get more light for the same energy or be able

to reduce the wattage to obtain the same delivered lumens. Do not accept LED wattage only (a "90 watt" LED fixture shall be driven at 700 mA and have a system wattage of 250 watts)

7.3.19.6 Electronic: Requirements are indicated below.

- Voltage range shall be (120-277) +/- 10%
- Current .35 Add (+/- 5%)
- Frequency 50/60 Hz
- Power Factor >90% at full load
- THD <20% at full load
- Load regulation: +/- 1% from no load to full load
- Output ripple <10%
- Output should be isolated
- Case temperature rated for -40° through +80 °
- Overheat protection
- Self-limited short circuit protection and overload protected
- Primary fused

7.3.20 Emergency Vehicle Pre-Emption System

- 7.3.20.1 Emergency vehicle preemption hardware shall be "Opticom Traffic Control System," identical to and fully compatible with the existing fire preemption equipment in use at the local fire district or as updated versions by the same manufacturer.
- 7.3.20.2 The Contractor shall install Preempt equipment as follows:
 - 7.3.20.2.1 Opticom Detector Unit (ODU) - Model Number 711, 721 or 722 as identified on the plans.
 - 7.3.20.2.2 Opticom Model No. 752 Phase Selector.
 - 7.3.20.2.3 The Model 752 Phase Selector Harness shall be pre-installed in the controller cabinet.
 - 7.3.20.2.4 The detector cable shall be 3M (Opticom) Model No. 138 cable.
 - 7.3.20.2.5 The Contractor shall remove and reinstall the indicated optical detectors from the existing traffic signal emergency vehicle pre-emption (EVP) system. The Contractor shall install the removed optical detectors using new detector

cables and providing all wiring necessary in the controller cabinet to provide a complete and operable system, as shown on the plan, and according to the manufacturer's recommendations. New optical cable furnished by the Contractor shall be 3M Company, Opticom brand.

- 7.3.20.3 The Contractor shall mark the optical detector location for the City to verify prior to the actual installation.
- 7.3.20.4 All optical cables shall be labeled in the controller cabinet and in the pullbox adjacent to the signal standard with appropriate phase designation.
- 7.3.20.5 The optical cable shall have a minimum of four feet of slack in the controller cabinet.
- 7.3.20.6 The Contractor shall have a representative of the 3M Company perform all optical equipment connections in the controller cabinet.
- 7.3.20.7 The Contractor shall demonstrate that the optical equipment installed perform satisfactorily as a system. Satisfactory performance shall be determined by having the 3M Company representatives verify that the system is properly installed per the manufacturer's recommendations.
- 7.3.20.8 Two 3M Company representatives shall have their own vehicle, equipped with a Class II (emergency) optical emitter assembly, and two-way radios to perform the test.
- 7.3.20.9 Adjust (fine-tune) the timing range as necessary and re-test.
- 7.3.20.10 One (1) spare optical detector shall be supplied.

7.3.21 In Roadway Warning Lights (IRWL)

- 7.3.21.1 In general, the IRWL shall conform to the CAMUTCD requirements for installation. Any deviation shall of this shall be prepared on letterhead and submitted to the Director of Public Works for review.
- 7.3.21.2 System Controller: The system controller shall be model SC-TS1000 as distributed by Traffic Safety Corporation or an approved equal prior to bidding. In order to be approved equal, the proposed device must satisfy the following requirements:
 - 7.3.21.2.1 System controller must support multiple CA MUTCD compliant regular and enhanced flash patterns and be capable of activating different enhanced patterns per system activation.
 - 7.3.21.2.2 Output pattern operation and power limitations with the primary DC.

- 7.3.21.2.3 Power Output where on 12 VDC models the maximum DC power output of the primary is 96 watts. The output pattern selected by pattern selector, Secondary DC Power Output: On 12 VDC models the maximum DC power output of the secondary is 96 watts. The output pattern selected by output mode selector switches: 1 -Same as primary; 2 - In Sync with primary, but non-enhanced; 3 - Non-enhanced complement of primary; 4 - Continuous flashing. The outputs support continuous, flashing and wig-wag operation. The combined DC Power output for 12 VDC models is 120 watts maximum. The AC AUX power output on AC auxiliary output is 360. The AC AUX Outputs are synchronized with DC outputs. The outputs support continuous, flashing and wig-wag operation.
- 7.3.21.2.4 System controller must be based on an integrated, high speed 8-bit microcontroller with non-volatile firmware and memory. All settings must remain intact in loss of power.
- 7.3.21.2.5 System controller must include the following controls and indicators:
- 7.3.21.2.5.1 Power indicator system must include a visual indicator lamp for system power.
- 7.3.21.2.5.2 The activation duration setting must be field adjustable in one second increments with a range from 1-99 seconds and indicated on digital numeric display.
- 7.3.21.2.5.3 The flash pattern setting must be field adjustable and indicated on digital numeric display.
- 7.3.21.2.5.4 The push button test and indication must include an internal push button for on-site testing and a visual indicator lamp for internal or external push button or activation device signals.
- 7.3.21.2.5.5 The override switch must include an internal switch for constant-on system activation.
- 7.3.21.2.5.6 The output indicators must include visual indicator lamps for system activation, primary output, and auxiliary output.
- 7.3.21.2.6 System must support activation from standard contact-closure type push buttons, talking push buttons and/or pedestrian sensor.
- 7.3.21.2.7 System must support a field selected extend option for system activation, to allow or disallow re-triggering of the activation period.

- 7.3.21.2.8 System must include an adequate number of clearly labeled and/or color coded terminal blocks for system installation. Terminal blocks must be located to provide adequate access to the installer.
- 7.3.21.2.9 System protection:
 - 7.3.21.2.9.1 Input AC voltage must be protected by a thermal/magnetic circuit breaker.
 - 7.3.21.2.9.2 DC electronics must be electrically isolated from AC input voltage.
 - 7.3.21.2.9.3 AC to DC converter must include transient surge protection or an external transient surge protection device must be used.
 - 7.3.21.2.9.4 AC and DC outputs must be protected with replaceable fuse.
 - 7.3.21.2.9.5 System must be enclosed in a NEMA 4 rated enclosure or better. System must include a No. 2 cabinet lock or better.
- 7.3.21.2.10 System shall be housed in an aluminum NEMA 4 enclosure (19" H x 14" W x 7.5" D) with a No. 2 lock to provide protection from adverse weather and security from unauthorized access.
- 7.3.21.2.11 Warranty - The system controller shall be warranted against defects in workmanship and materials for one year from date of shipment and be eligible for a 5-Year Limited System Warranty.
- 7.3.21.3 In-Pavement Fixtures: The fixture shall be model FI-TS600 distributed by Traffic Safety Corporation or approved equal prior to bidding. In order to be considered equal, the alternate fixture shall satisfy the following requirements:
 - 7.3.21.3.1 Construction - The fixture shall be bi-directional and easily convertible to uni-directional to meet site specific requirements and of modular design comprised of a top casting and two (2) pre-focused optical cartridges made of high tensile strength aluminum alloy. The fixture shall be 0.00" above grade when mounted in the factory supplied mounting base. The diameter of the fixture shall not exceed 8" and all mounting hardware shall be stainless steel.
 - 7.3.21.3.2 Durability - The fixture shall withstand a static load of 44,000 lb. without sustaining permanent deformation or cracking of materials. Leads, gaskets, etc. shall be rated to withstand 300 degrees F.
 - 7.3.21.3.3 LED/Light Cartridge - Each lens shall be molded of high performance optical grade glass and formed in a removable factory sealed optical cartridge. Two cartridges required per fixture. Each cartridge consumes

4.2 watts per cartridge (8.4 watts per fixture) during the activation period of the fixture.

- 7.3.21.3.4 Photometric Performance - The fixture shall have both daytime and nighttime visibility exceeding that of a 50-watt halogen lamp, using a yellow light.
- 7.3.21.3.5 Finish - The fixture shall be anodized natural aluminum and be dark grey in color.
- 7.3.21.3.6 One (1) spare fixture shall be supplied with the system.
- 7.3.21.4 LED Crossing Sign: The LED crossing sign shall be model SI-TS30 as distributed by Traffic Safety Corporation or approved equal. In order to be approved equal, the proposed device must meet or exceed the following requirements:
 - 7.3.21.4.1 Sign Substrate - The sign substrate shall be highway grade 0.08 inch aluminum backing to provide durability and resist corrosion.
 - 7.3.21.4.2 Reflective Sheeting - The reflective sheeting shall be fluorescent yellow-green, 3M-Diamond-grade sheeting with an Anti-graffiti overlay to maximize visibility under all weather conditions, day or night and provide resistance to vandalism.
 - 7.3.21.4.3 Light Emitting Source - High Intensity Luxeon LEDs with a life expectancy of over 100,000 hours shall be used. Power consumption shall be approximately 3.6 watts (pedestrian crossing sign) and 3.0 watts (school crossing sign). Pedestrian crossing signs shall employ eight LEDs. School crossing signs shall employ five LEDs. Each LED shall be sealed in a 7/8 inch diameter, heat dissipating plastic enclosure to provide resistance to weather and vibration. All LED enclosures shall be mounted in a 1 inch hole and ultrasonically welded to the sign assembly to provide maximum strength and rigidity.
 - 7.3.21.4.4 Wiring - All wire used shall conform to military specifications MIL-W-16878D, Type D vinyl nylon jacket and covered and secured to the sign assembly using a 1 inch x 3/8 inch aluminum extrusion to provide resistance to weather and tampering.
 - 7.3.21.4.5 LED Connectors - All LED connectors shall conform to Ingress protection (IP-67 rating), be dust proof, and provide protection from temporary immersion in water up to 3 feet deep for 30 minutes. Connectors shall be Deutsch DTM series.

- 7.3.21.4.6 Mounting - Signs shall include mounting provision for mounting to poles and posts (supplied by other vendors) and include vandal-resistant mounting hardware (bolts, washers, vandal-resistant nuts) and custom tool for securing vandal-resistant nuts.
- 7.3.21.4.7 Models - Signs shall be available in both pedestrian crossing and school crossing models in both 30 inch and 36 inch versions, in 12 VDC and 120 VAC versions.
- 7.3.21.4.8 Warranty - The TS30 shall be warranted against defects in workmanship and materials for one year from the date of shipment and is eligible for TSC's 5-Year Limited Warranty.
- 7.3.21.5 Mounting Base: Fixtures shall be installed in a mounting base (TSCs # BA-725-10-2) of high strength steel, hot dip galvanized after fabrication per ASTM-153 specifications, with a 7.25" diameter bolt circle, a 0.75" mud ring, and standard base depth of 10". The base shall be supplied with stainless steel bolts and a plywood cover to protect the mounting flange during installation. The height of the base shall be adjustable using spacers or extensions to facilitate roadway resurfacing.
- 7.3.21.6 Guaranteed Warranty: The manufacturer of the required optical priority control system will warrant that the provided priority control system has been properly installed, operated and maintained, component parts of a matched component system that prove to be defective in workmanship and/or material during the first five years from the date of shipment from the manufacturer will be covered in a documented system-protection plan, plus an added five-year warranty for repair or replacement at a fixed deductible charge for a total of ten (10) years of product coverage. The protection plan will warrant that component parts of a matched component system that prove to be defective in workmanship and/or material during the first five years from the date of shipment from manufacturer will be repaired at no charge, and that extended coverage with a fixed repair deductible will be available for an additional five years. In total, the warranty coverage must assure 10-year operational reliability and interface compatibility with future components designed for the system. A copy of the manufacturer's warranty shall be supplied with the bid.
- 7.3.21.7 System Operation: The Contractor shall demonstrate that each system will perform satisfactorily. Satisfactory performance shall be determined using the following test procedure:
- 7.3.21.7.1 Each system to be used for testing shall consist of an optical emitter assembly, an optical detector, at least 200 feet of optical detector cable and a discriminator module.

- 7.3.21.7.2 The discriminator modules shall be installed in the proper input file slot of a Model 332 controller cabinet.
- 7.3.21.7.3 Two tests shall be conducted; one using a Class I signal emitter and a distance of 1,800 feet between the emitter and the detector, the other using a Class II signal emitter and a distance of 2,500 feet between the emitter and the detector. All range adjustments on the module shall be set to "Maximum" for each test. Test shall show that all systems function as described herein and that the channels are assigned correctly. The following shall be the channel assignments; Channel A shall be for phases 2 and 5, Channel B shall be for phases 4 and 7, Channel C shall be for phases 1 and 6, Channel D shall be for phases 3 and 8.
- 7.3.21.7.4 Each above test shall be conducted for each channel of the system.
- 7.3.21.7.5 Each above test shall be conducted for a period of one hour, during which the emitter shall be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute off interval. During the total test period (1) the emitter signal shall cause the proper response from the Model 170 controller unit during each "on" interval and (2) there shall be no improper operation of either the Model 170 controller unit or the monitor during each "off" interval.
- 7.3.21.7.6 The Contractor shall provide all equipment necessary to perform the tests.

7.3.22 Numbering Electrical Equipment

- 7.3.22.1 The Contractor shall place the numbers on the equipment as shown on the plans or as directed by the City.
- 7.3.22.2 Reflective numbers shall be applied to a clean surface. Only the edges of the numbers shall be treated with edge sealer.
- 7.3.22.3 Where shown on the plans, 5-digit, self-adhesive equipment numbers shall be placed for all electroliers, soffit lighting, sign lighting and service pedestals, the numbers shall be placed on the front door. On electroliers, the numbers shall be placed as shown on Standard Plan ES-6A.

7.3.23 PRE-SYSTEM TURN-ON PROCEDURE

- 7.3.23.1 System shall be fully functional and Contractor shall safety check all items before system turn-on is requested.
- 7.3.23.2 All equipment shall be installed and aimed appropriately before system turn-on is requested.

- 7.3.23.3 All signals must remain covered until the day of the scheduled turn-on. Contractor must flash signal, viewing flash verification through small holes cut in the signal face coverings, and before system turn-on is requested.
- 7.3.23.4 All roadway work, striping, signing etc shall be complete before system turn-on is requested. All detector loops shall be installed and verified as functional before system turn-on is requested.
- 7.3.23.5 All cameras shall be installed and detection zones shall be programmed before a system turn-on is requested.
- 7.3.23.6 Controller representative must make an appointment to City Traffic Engineering staff to pick up the signal timing sheet. Controller representative must input timing into the controller and cut diode board before system turn-on is requested.

7.3.24 Turn-On Procedure

- 7.3.24.1 Temporary all way STOP equipment must be installed before the scheduled turn-on time. If equipment is not in place, City will cancel the scheduled turn-on due to Contractor default. It will be Contractor's responsibility to reschedule the system turn-on for a later date that corresponds to Traffic Engineering staff schedule.
- 7.3.24.2 If any equipment is missing or not completely installed at the time of the scheduled system turn-on, City will cancel the scheduled turn-on due to Contractor default. It will be Contractor's responsibility to reschedule the system turn-on for a later date that corresponds to Traffic Engineering staff schedule.
- 7.3.24.3 If controller is not programmed with signal timing or diode board is not cut at the time of the scheduled system turn-on, City will cancel the scheduled turn-on due to Contractor default. It will be Contractor's responsibility to reschedule the system turn-on for a later date that corresponds to Traffic Engineering staff schedule.
- 7.3.24.4 If representative for the controller and the camera are not present at the time of the scheduled system turn-on, City will cancel the scheduled turn-on due to Contractor default. It will be Contractor's responsibility to reschedule the system turn-on for a later date that corresponds to Traffic Engineering staff schedule.
- 7.3.24.5 During the scheduled turn-on, Contractor shall remove covers from signal heads and signal shall be completely flashed-out. At this time emergency vehicle detection equipment will also be verified.

- 7.3.24.6 Once signal is fully flashed, signal will be put into all-red flash.
- 7.3.24.7 Contractor shall remove all covers from signs and conflicting or unnecessary signage including temporary STOP equipment.
- 7.3.24.8 Contractor shall place signal into full operation.
- 7.3.24.9 City, Contractor, and representative/s shall observe signal operations and make adjustments as necessary.

7.3.25 Removing, Reinstalling, Salvaging Electrical Equipment

- 7.3.25.1 Salvaged electrical equipment and SIC shall be hauled to the City of Vallejo yard. For delivery destinations and instructions, contact City of Vallejo Maintenance Division, 111 Amador Street, Vallejo CA 94590, (707) 648-4518.
- 7.3.25.2 Unless directed otherwise, salvaged signal poles shall be hauled to the City of Vallejo yard on Lemon Street, Vallejo. Salvaged signal heads and controllers shall be hauled to the City of Vallejo yard at 1046 Virginia Street. All materials shall be neatly stacked.
- 7.3.25.3 The Contractor shall provide equipment, as necessary, to safely unload and stockpile the material. The Contractor shall notify and coordinate with Maintenance Division staff prior to delivery.
- 7.3.25.4 The Contractor shall remove the existing traffic signal poles and pedestrian push button poles as shown on the plans. Removal shall be accomplished by sawcutting at the base of the poles without disturbing the foundation. The sawcutting at the base shall be done to the top of sidewalk elevation and shall not create an obstruction or any tripping hazard on the sidewalk.
- 7.3.25.5 Full compensation for removing, reinstalling or salvaging electrical equipment shall be considered as included in the contract lump sum prices paid for signal modification work and no additional compensation will be allowed therefore.
- 7.3.25.6 If so indicated on the plans, the Contractor shall remove and dispose of existing equipment and material no longer required. Full compensation for removal and disposal of said equipment and material shall be considered as included in the contract lump sum or unit prices paid for the various items of work involved and no additional compensation will be allowed therefore.

7.3.26 Measurement/Payment

- 7.3.26.1 Payment for traffic signals shall be in accordance with Section 86-8, "Payment," of the Standard Specifications and these Special Provisions.

- 7.3.26.2 The work shall include excavation of pavement and earth, installation of conduit and backfilling per City of Vallejo's standard backfill procedure including replacement of the pavement, which shall conform to Section 0930, "Asphalt Concrete Paving and Related Work," of the Technical Specifications, installation of the lighting systems per City of Vallejo standard lighting systems.
- 7.3.26.3 Payment for installing the 3-inch conduit, including furnishing all labor, materials, tools, equipment, and incidentals shall be per bid. The work shall include excavation of pavement and earth, installation of 3-inch conduit and backfilling per City of Vallejo's standard backfill procedure including replacement of the pavement, which shall conform to Section 0930, "Asphalt Concrete Paving and Related Work," of the Technical Specifications.
- 7.3.26.4 Payment for removing and relocating existing traffic signal pull boxes, including furnishing all labor, materials, tools, equipment, and incidentals, as shown on the plans. The work shall include excavation of pavement and earth, removing and relocating traffic signal pull boxes and associated wiring and backfilling per City of Vallejo's standard backfill procedure including replacement of the pavement, which shall conform to Section 0930, "Asphalt Concrete Paving and Related Work," and replacement of concrete shall conform to Section 0700, "Concrete" of the Technical Specifications.
- 7.3.26.5 Full compensation for relocating and reinstalling existing electrical equipment, including furnishing all labor, materials, tools, equipment, and incidentals, as shown on the plans shall be considered as included in the lump sum contract price for the traffic signal and lighting installation and no additional compensation will be allowed therefore.
- 7.3.26.6 Payment for replacement of the pavement in the loop area shall conform to Section 0930, "Asphalt Concrete Paving and Related Work," of the Technical Specifications.
- 7.3.26.7 Full compensation for hauling and stockpiling electrical material shall be considered as included in the contract lump sum prices paid for signal, lighting, and signal interconnect and no additional compensation will be allowed therefore.
- 7.3.26.8 All other aspects of conforming to the requirements of this section shall be considered as included in the prices paid for the various contract bid items of work and no additional allowance will be made therefore.

END OF SECTION

This page intentionally left blank

PART B STANDARD DRAWINGS (CONSTRUCTION DETAILS)

EARTHWORK

- 2-01 TERMS USED WITH HILLSIDE HOMES
- 2-02 STRUCTURAL FINISH FILL DETAIL
- 2-03 TYPICAL TOE OF KEY FILL
- 2-04 ROCK DISPOSAL DETAIL-1 OF 2
- 2-05 ROCK DISPOSAL DETAIL-2 OF 2
- 2-06 IMPORT OR EXPORT TRUCK ROUTE
- 2-07 CONCRETE LINED DITCH

STREETS

- 3-01 CITY APPROVAL BLOCKS
- 3-02 STREET IMPROVEMENT CROSS-SECTION
- 3-03 CUL-DE-SAC AND HALF CUL-DE-SAC DETAILS
- 3-04 NORMAL INDUSTRIAL STREETS SERVING ABUTTING PROPERTY
- 3-05 ALLEY PAVEMENT CROSS-SECTION
- 3-06 STREET BARRICADE
- 3-07 APRON AND JOINT DETAILS
- 3-08 CURB, GUTTER, AND SIDEWALK DOWELING DETAIL
- 3-09 EXPANSION AND OTHER JOINT DETAILS
- 3-10 CURB, GUTTER, AND SIDEWALK
- 3-11 VALLEY GUTTER
- 3-12 RESIDENTIAL DRIVEWAY WITH SEPERATED SIDEWALK AND PLANTER
- 3-13 RESIDENTIAL DRIVEWAY RETROFIT – TYPE 1
(ADJOINING VERTICAL CURB AND GUTTER)
- 3-14 RESIDENTIAL DRIVEWAY RETROFIT – TYPE 2
(ADJOINING VERTICAL CURB AND GUTTER)
- 3-15 COMMERCIAL DRIVEWAY
- 3-16 COMMERCIAL DRIVEWAY RETROFIT
- 3-17 MONOLITHIC CURB WALL
- 3-18 MEDIAN CURB
- 3-19 SIDEWALK CROSS DRAIN
- 3-20 TO RAISE A WATER VALVE, MANHOLE, OR STREET MONUMENT
- 3-21 CURB RAMP NOTES REFERENCE - TITLE 24
- 3-22 TYPE 1 CURB RAMP DETAIL
- 3-23 TYPE 2 CURB RAMP DETAIL
- 3-24 TYPE 4 CURB RAMP DETAIL
- 3-25 TYPE 5 CURB RAMP DETAIL
- 3-26 TYPE 11 CURB RAMP DETAIL
- 3-27 MODIFIED TYPE 2 CURB RAMP DETAIL
- 3-28 BUS PARKING BAY
- 3-29 TYPICAL TRENCH BACKFILL STANDARD DETAIL
- 3-30 PCC ALLEY WING CROSSING

- 3-31 MONUMENT CASTINGS
- 3-32 ALTERNATE CAST IRON MONUMENT CASTINGS
- 3-33 INSTALLATION DETAILS, CITY SURVEY MONUMENT AND BENCH MARK

WATER

- 4-01 FIRE SPRINKLER SERVICE BACKFLOW PREVENTER INSTALLATION (FOR DOUBLE-DETECTOR CHECK VALVE ASSEMBLY WITH VALVES IN-LINE)
- 4-02 3/4" & 1" WATER METER INSTALLATION
- 4-03 3/4" & 1" WATER SERVICE INSTALLATION
- 4-04 1-1/2" & 2" WATER SERVICE INSTALLATION
- 4-05 FIRE HYDRANT INSTALLATION WATER DISTRIBUTION SYSTEM
- 4-06 THRUST BLOCK & ANCHOR BLOCK DETAILS FOR 4", 6", 8" & 12" FITTINGS
- 4-07 REVERSE ANCHOR AND TEMPORARY BLOW OFF
- 4-08 2" DIA. BLOW OFF ASSEMBLY
- 4-09 6" DIA. BLOW OFF ASSEMBLY (UNIMPROVED AREAS)
- 4-10 6" DIA. BLOW OFF ASSEMBLY (IMPROVED AREAS)
- 4-11 CHECK VALVE ASSEMBLY
- 4-12 ZONE VALVE ASSEMBLY
- 4-13 1" & 2" AIR RELIEF VALVE (COMBINATION AIR/VACUUM AND AIR RELEASE VALVE)
- 4-14 VALVE ASSEMBLY & TRACKER WIRE INSTALLATION
- 4-14A VALVE ASSEMBLY WATER VALVE BOX
- 4-15 MANHOLE FRAME & COVER, 24"
- 4-16 6" PRESURE REDUCING STATION
- 4-17 3" COMPOUND METER INSTALLATION WITH 2" BYPASS
- 4-18 4" COMPOUND METER INSTALLATION WITH 2" BYPASS
- 4-19 6" COMPOUND METER INSTALLATION WITH 2" BYPASS
- 4-20 2" BYPASS FOR INSTALLATION WITH 3", 4", & 6" COMPOUND METERS
- 4-21 BACKFLOW PREVENTER FOR INSTALLATION WITH 3", 4", & 6" COMPOUND METERS

LANDSCAPE

- 5-01 IRRIGATION LINE TRENCHING DETAILS
- 5-02 IRRIGATION CONTROLLER MOUNTING DETAIL
- 5-03 SATELLITE ASSEMBLY WITH METER DETAIL
- 5-04 SATELLITE ASSEMBLY WITHOUT METER DETAIL
- 5-05 MASTER VALVE DETAIL
- 5-06 ISOLATION/GATE VALVE DETAIL
- 5-07 REMOTE CONTROL VALVE ASSEMBLY
- 5-08 VALVE ASSEMBLY FOR DRIP SYSTEM
- 5-09 QUICK COUPLER DETAIL
- 5-10 POP UP SPRAY AND SWING JOINT DETAIL
- 5-11 ROTOR DETAIL
- 5-12 DEEP ROOT BUBBLER DETAIL

- 5-13 DRIP BUBBLER DETAIL
- 5-14 FLUSH VALVE DETAIL
- 5-15 SLEEVING DETAIL
- 5-16 VALVE WIRE SPLICE DETAIL
- 5-17 IRRIGATION VALVE BOX INSTALLATION DETAIL
- 5-18 DRIP EMITTER DETAIL
- 5-19 DRIP BUBBLER DETAIL FOR LOW FLOW SYSTEM
- 5-20 RADIO - HIGH GAIN ANTENNA
- 5-21 MASTER VALVE AND FLOW CONTROL DETAIL
- 5-26 15 GALLON TREE PLANTING DETAIL
- 5-27 24" BOX OR LARGER TREE PLANTING DETAIL
- 5-28 SLOPE TREE PLANTING DETAIL
- 5-29 TREE GUYING DETAIL
- 5-30 SHRUB PLANTING DETAIL
- 5-31 SLOPE SHRUB PLANTING DETAIL
- 5-32 MEDIAN AND GORE TREE PLANTING DETAIL
- 5-33 MEDIAN GORE SHRUB PLANTING DETAIL
- 5-34 GROUND COVER PLANTING DETAIL
- 5-35 ROOT BARRIER DETAIL
- 5-36 HEADERBOARD DETAIL
- 5-37 BOULDER INSTALLATION DETAIL
- 5-38 COBBLE DETAIL

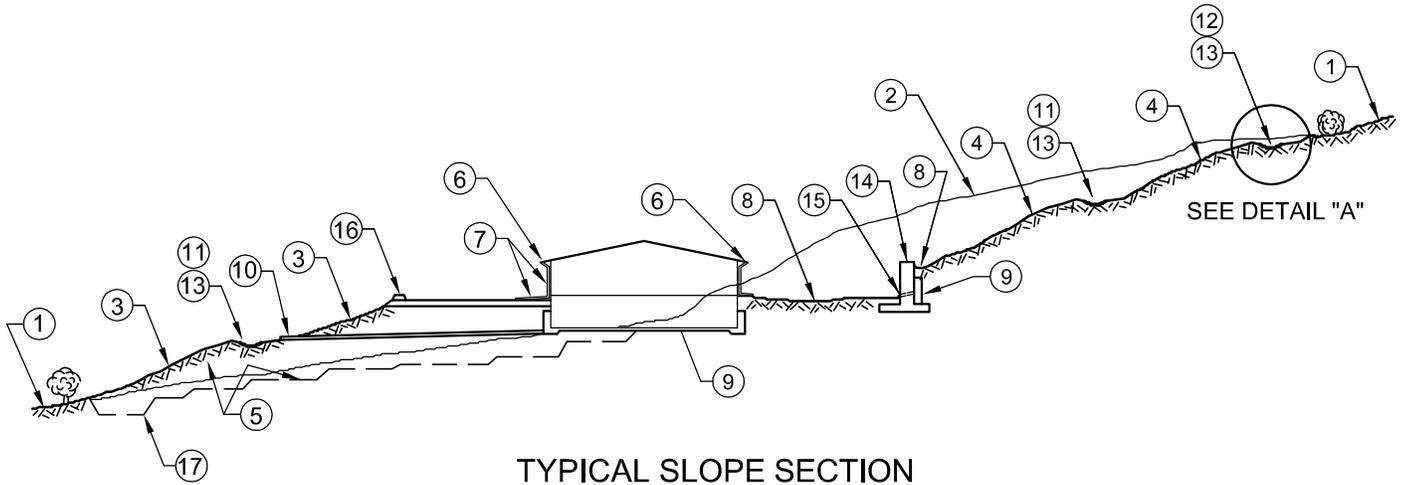
PUBLIC FENCING

- 6-01 PUBLIC FENCE DETAILS
- 6-02 PIPE BARRIER GATES -TO PG&E TOWER PADS OR OPEN SPACE(1 OF 3)
- 6-03 PIPE BARRIER GATES –LATCH/LOCK & PIVOT POST DETAILS (2 OF 3)
- 6-04 PIPE BARRIER GATES –LIST OF MATERIALS (3 OF 3)

TRAFFIC SIGNALS

- 7-01 STREET LIGHT POLE
- 7-02 LIGHT POLE NUMBER
- 7-03 STREET LIGHT LUMINAIRE
- 7-04 CHART FOR ESTIMATE OF TRAFFIC INDEX USING A HOUSE COUNT
- 7-05 CONVERSION CHART - AVERAGE DAILY TRAFFIC TO TRAFFIC INDEX
- 7-06 TRAFFIC SIGN LOCATIONS
- 7-07 TRAFFIC SIGN INSTALLATION-1 OF 3
- 7-08 TRAFFIC SIGN INSTALLATION-2 OF 3
- 7-09 TRAFFIC SIGN INSTALLATION-3 OF 3
- 7-10 TYPICAL STREET NAME SIGN SPECIFICATIONS
- 7-11 STREET SIGN BRACKETS 90 DEGREE SEPARATOR
- 7-12 STREET SIGN BRACKETS POST CAP, SIGN HOLE DETAIL
- 7-13 TYPICAL BIKE LANE CROSS-SECTIONS AND LANE MARKINGS
- 7-14 AC PAVEMENT KEY CUTTING DETAIL
- 7-15 SPEED HUMP & PAVEMENT UNDULATIONS
- 7-16 CITY STANDARD BIKE PATH
- 7-17 ILLUMINATION # 1
- 7-18 ILLUMINATION # 2
- 7-19 CIRCULAR LOOP INSTALLATION
- 7-20 CROSWALK STANDARDS
- 7-21 I.I.S.N.S. STANDARD

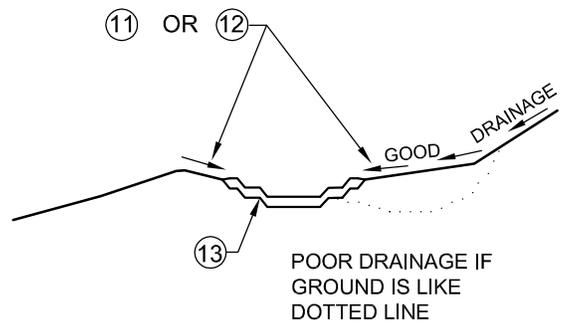
This page intentionally left blank



TYPICAL SLOPE SECTION

NOTES

- ① NATURAL GROUND SLOPE
- ② ORIGINAL GROUND SLOPE
- ③ FILL SLOPE
- ④ CUT SLOPE
- ⑤ FILL COMPACTED TO ENGINEERING SPECIFICATIONS AND BENCHED INTO FIRM GROUND
- ⑥ ROOF GUTTER
- ⑦ DOWNSPOUT CONNECTED TO AN UNPERFORATED PIPE OR LINED DITCH WATER COLLECTION SYSTEM
- ⑧ DRAINAGE SWALE OR DITCH
- ⑨ SUBDRAIN (PERFORATED PIPE AND PERMEABLE MATERIAL)
- ⑩ SUBDRAIN DISCHARGE (UNPERFORATED PIPE)
- ⑪ DRAINAGE TERRACE AND DITCH (SEE DETAIL "A", CONSTRUCTED AS APPROVED)
- ⑫ BROW DITCH
- ⑬ LINED DRAINAGE DITCH (SEE DETAIL "A", CONSTRUCTED AS APPROVED)
- ⑭ RETAINING WALL (BUILDING PERMIT REQUIRED)
- ⑮ WEEP-HOLES THROUGH RETAINING WALL
- ⑯ COMPACTED BERM TO DIRECT WATER OFF SLOPE
- ⑰ KEYWAY



DETAIL "A"



CITY OF VALLEJO STANDARD DETAIL

STANDARD TERMS USED
WITH HILLSIDE HOMES

APPROVED BY:

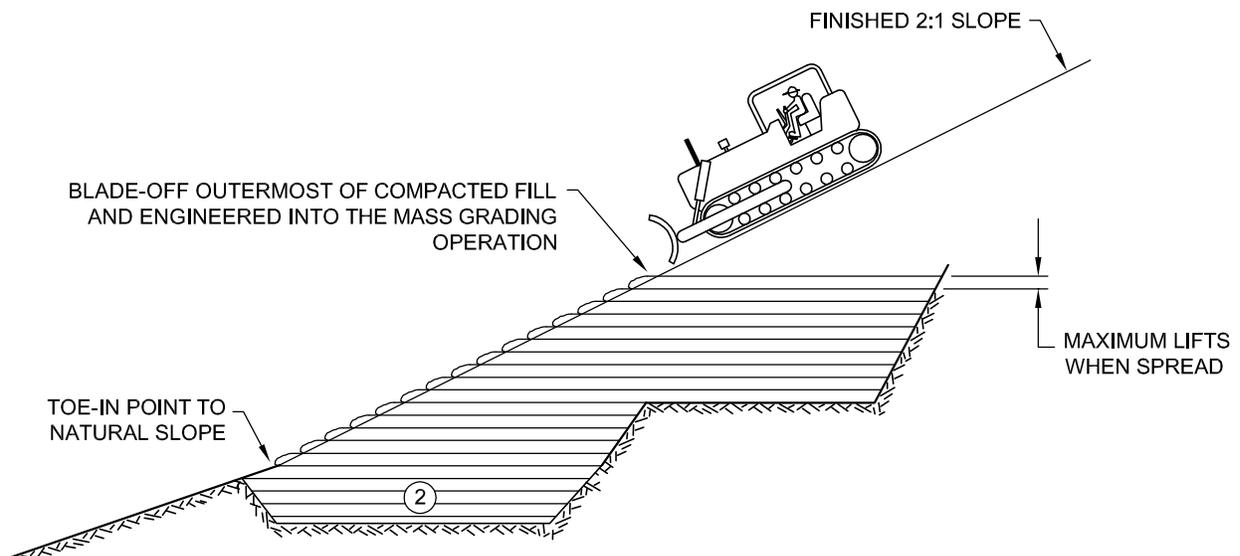
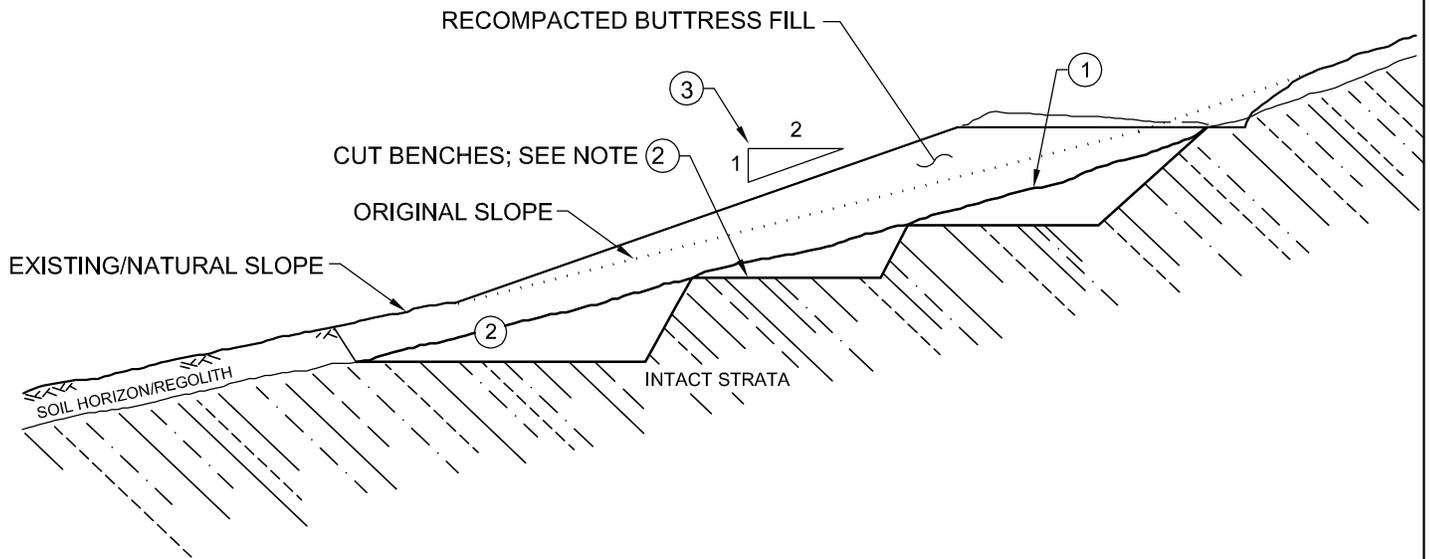
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

2-01

SCALE:
NONE

DATE:
09-13/11



COMPACTION: ALL STRUCTURAL FILL IS TO BE COMPACTED TO A MINIMUM VALUE OF 90% RELATIVE COMPACTION.

NOTES

- ① GRUB & SCARIFY SLOPE PRIOR TO EARTHWORK ACTIVITIES.
- ② BENCHES, KEYING, AND EXCAVATION TO EXTEND BENEATH THE SOIL OR REGOLITH HORIZON AT ALL LOCATIONS. THE REQUIRED DEPTH OF EXCAVATION IS TO BE CONFIRMED IN THE FIELD DURING CONSTRUCTION BY EITHER THE SOILS ENGINEER OR THE ENGINEERING GEOLOGIST.
- ③ THE MAXIMUM FINISH SLOPE IS TO BE 2:1 (HORIZONTAL TO VERTICAL).



CITY OF VALLEJO STANDARD DETAIL

STANDARD STRUCTURAL
FINISH FILL DETAIL

APPROVED BY:

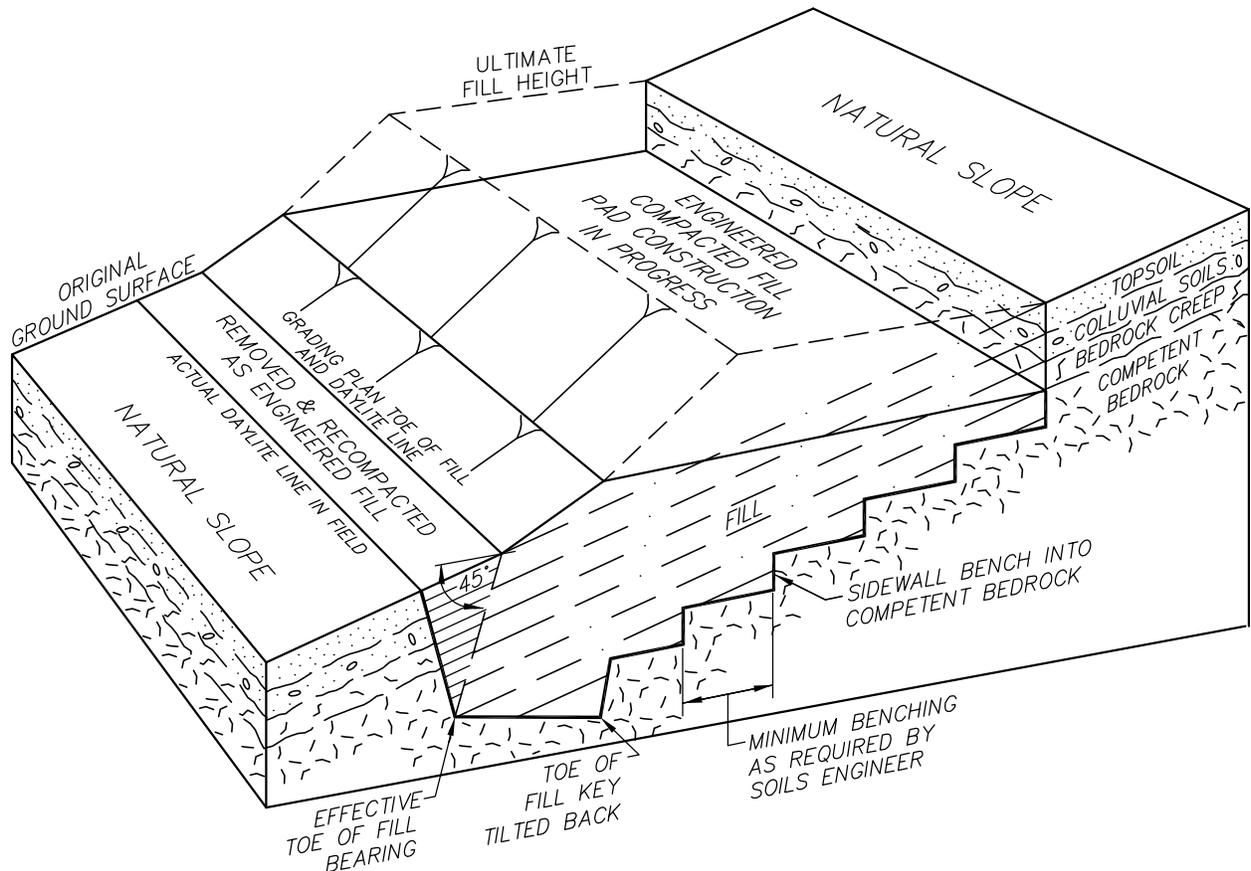
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

2-02

SCALE:
NONE

DATE:
09/13/11



NOTE

ALL KEYWAYS, BENCHING DIMENSIONS AND SUBDRAINS TO BE DETERMINED IN THE FIELD BY THE PROJECT SOILS ENGINEER AND/OR THE ENGINEERING GEOLOGIST.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPICAL TOE OF KEY FILL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

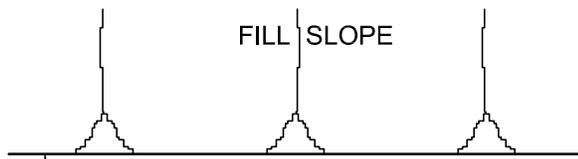
DRAWING NO:

2-03

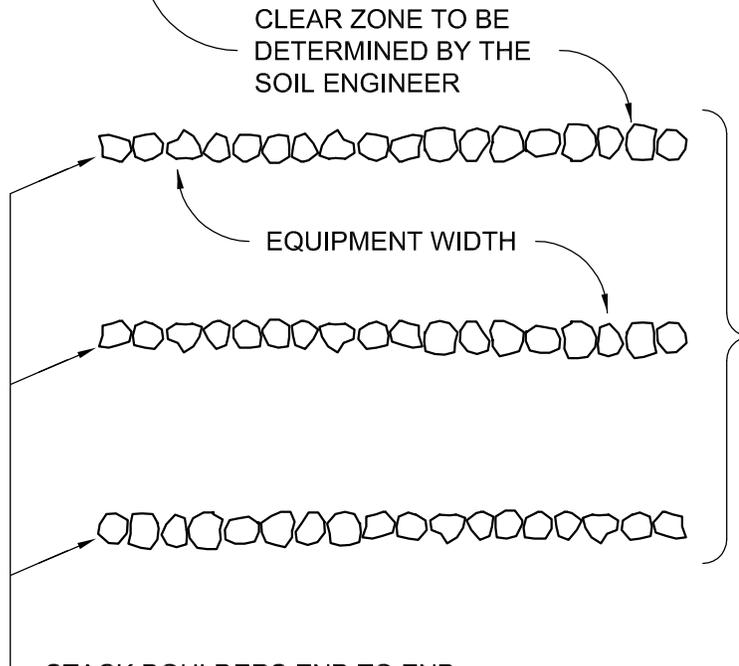
SCALE:
NONE

DATE:

09/13/11

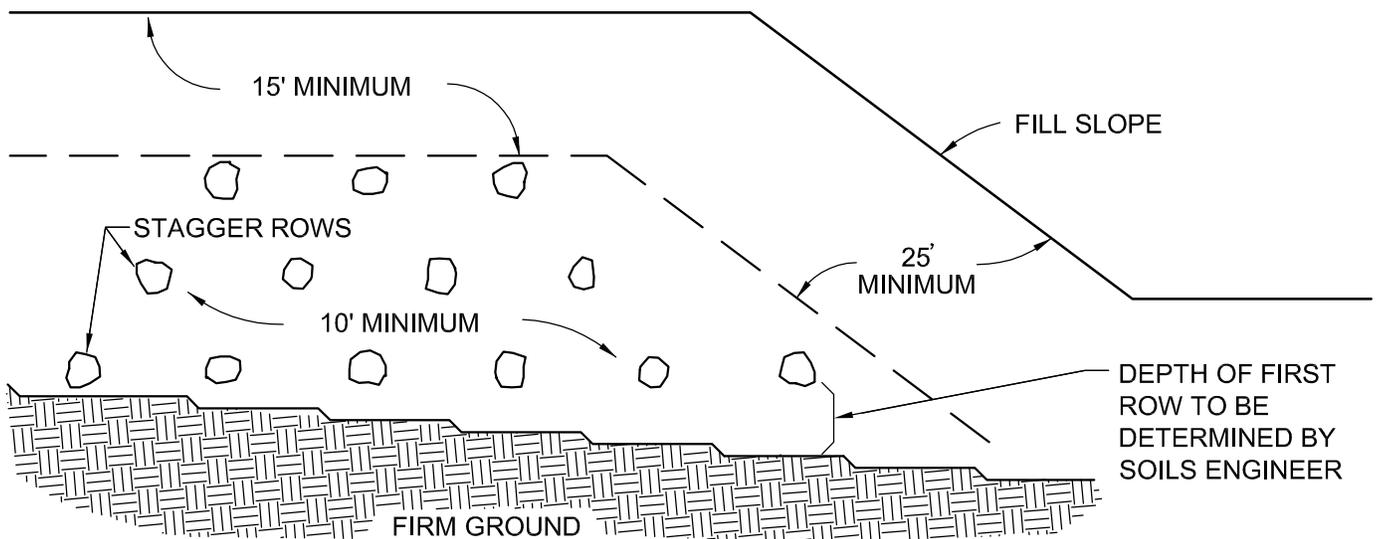


SPECIAL NOTE:
 THE PROJECT SOIL ENGINEER,
 DUE TO GEOTECHNICAL CRITERIA,
 COULD REFUSE PLACEMENT OF
 BOULDERS AS SHOWN IN THE
 ROCK DISPOSAL DETAIL.



SOIL SHALL BE PUSHED OVER
 ROCKS AND FLOODED INTO
 VOIDS. COMPACT AROUND AND
 OVER EACH WINDROW.

STACK BOULDERS END TO END.
 DO NOT CREATE A NEST BY PILING
 ROCKS UPON EACH OTHER.



CITY OF VALLEJO STANDARD DETAIL

STANDARD
 ROCK DISPOSAL DETAIL

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

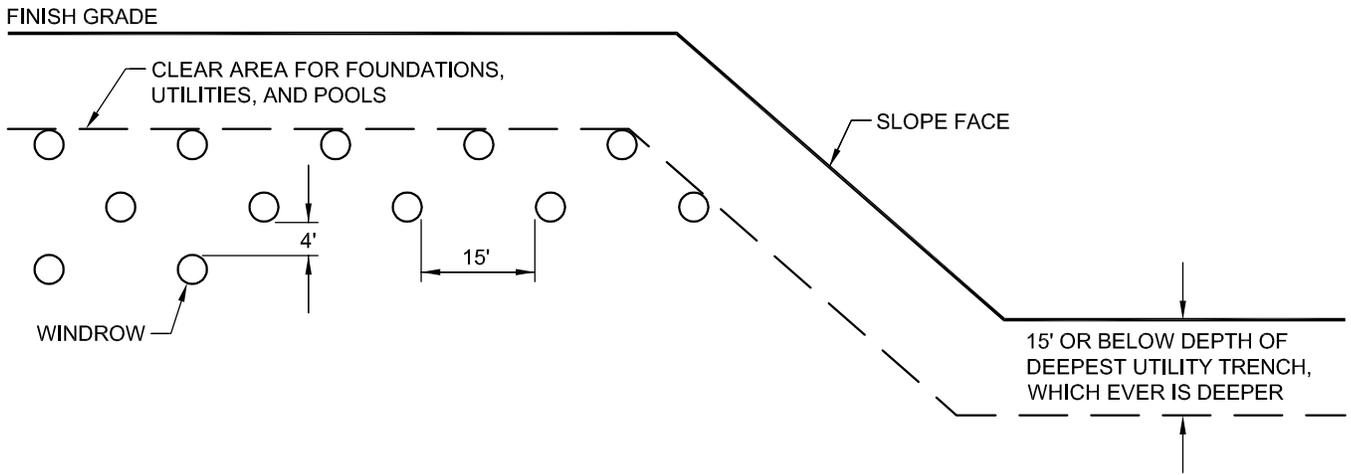
2-04

SCALE:
 NONE

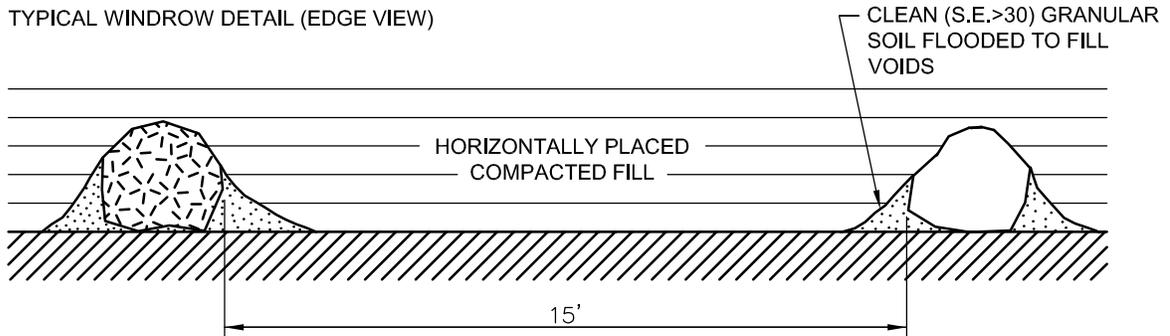
DATE:
 09/13/11

ROCK DISPOSAL DETAIL

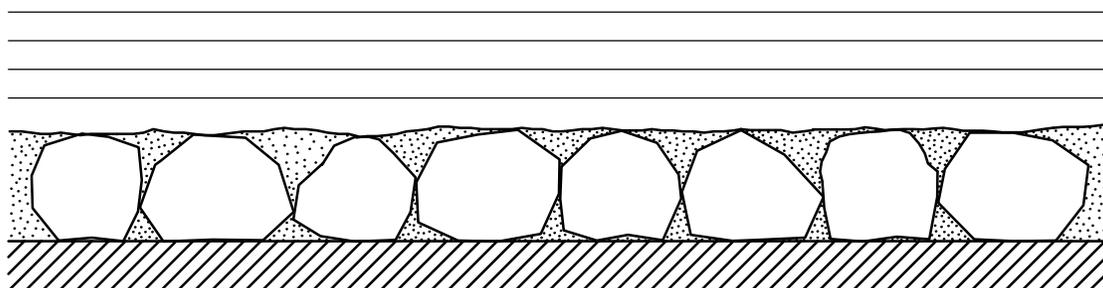
(BOULDERS GREATER THAN
TWO FEET IN DIAMETER)



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW



CITY OF VALLEJO STANDARD DETAIL

STANDARD
ROCK DISPOSAL DETAIL

APPROVED BY:

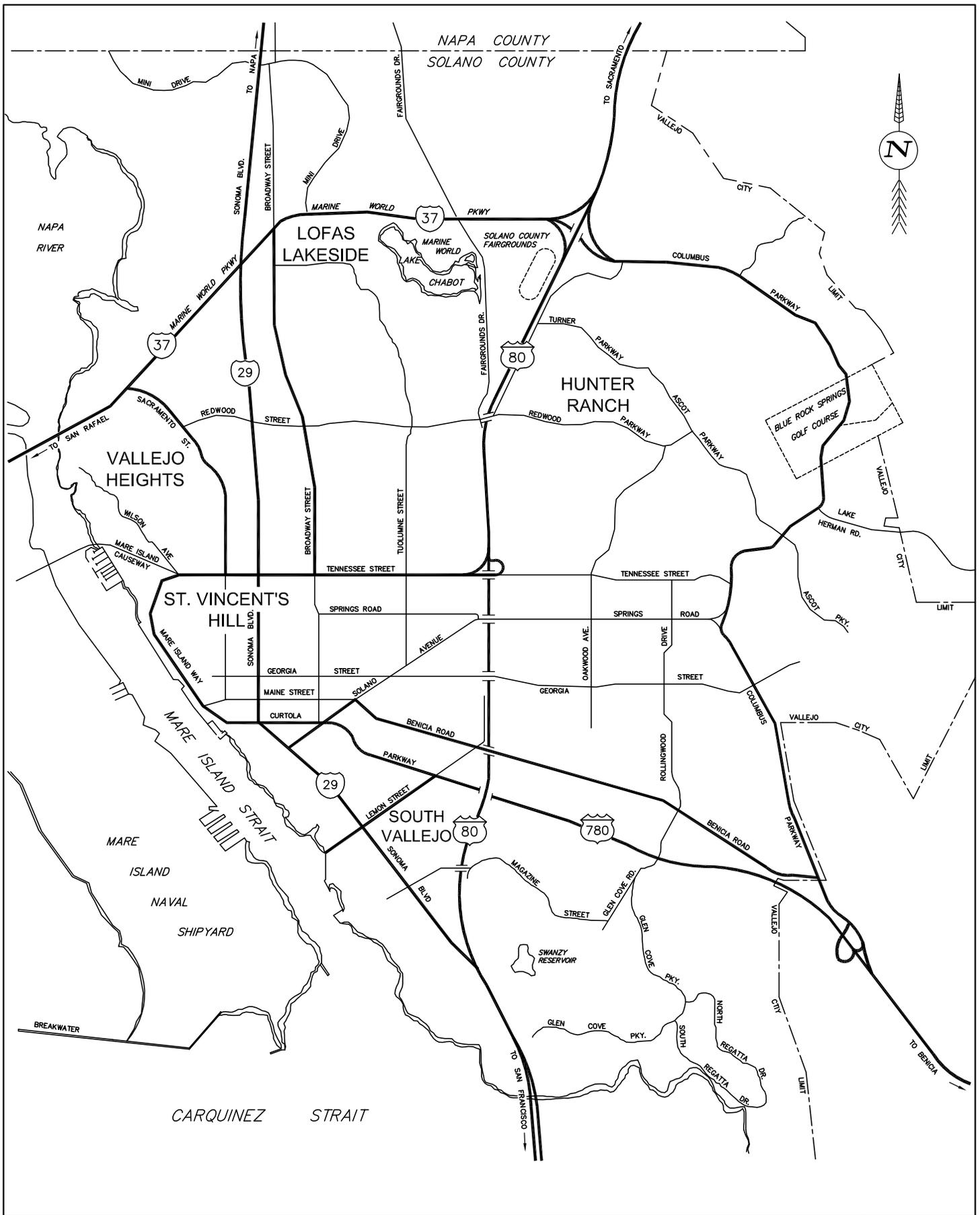
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

2-05

SCALE:
NONE

DATE:
9/13/11



CITY OF VALLEJO STANDARD DETAIL

TRUCK ROUTE

APPROVED BY:

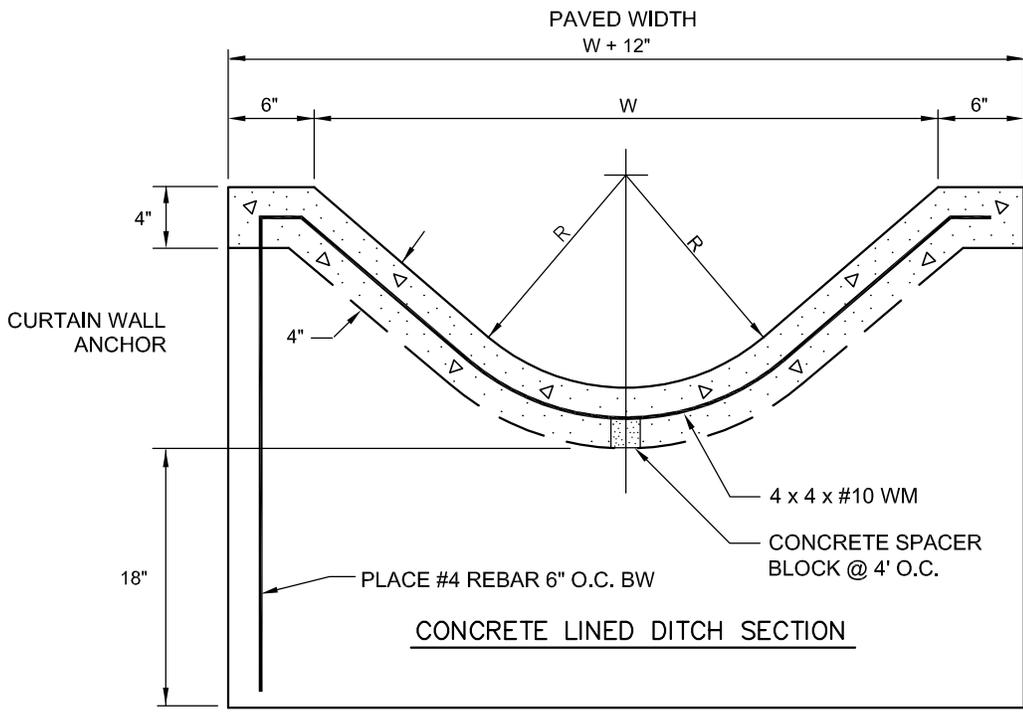


DIRECTOR OF PUBLIC WORKS

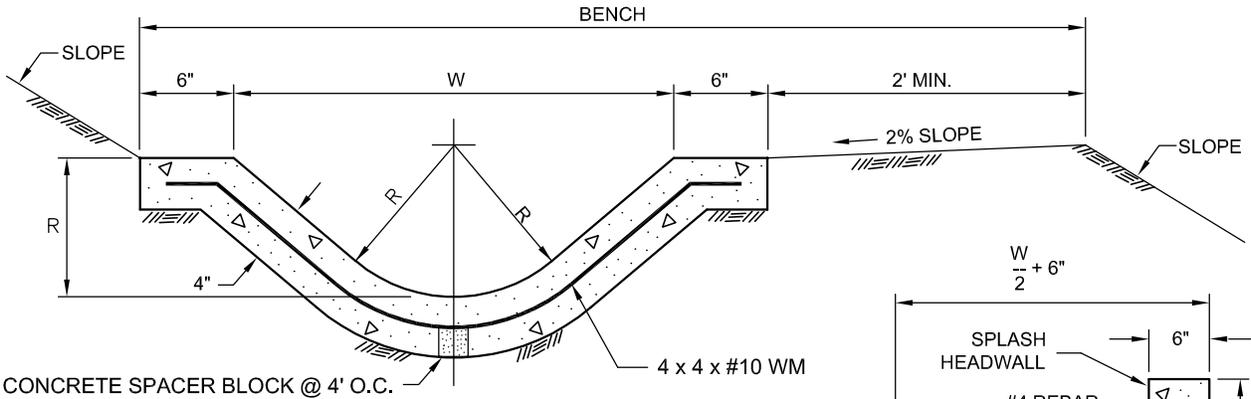
DRAWING NO:
2-06

SCALE:
NONE

DATE:
09/13/11

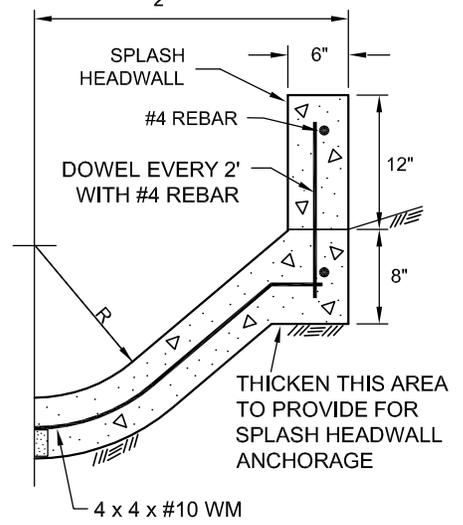


TYPE	R	W
A	12"	36"
B	18"	48"



BENCH CONCRETE LINED DITCH SECTION
NOTES

1. FINISHED BACKFILL SHALL BE FLUSHED AS SHOWN AFTER COMPACTION.
2. CONCRETE SHALL BE CLASS B.
3. INSTALL A DEEP JOINT AT EVERY 12' O.C.
4. PROVIDE SPLASH HEADWALL ON CURVES OR AS DIRECTED BY THE CITY ENGINEER
5. COMPACT FINISHED GROUND ON BOTH SIDES OF THE DITCH TO MINIMUM 90%.
6. WHERE A CONCRETE LINED DITCH CONNECTS TO A CATCH BASIN PLACE 4 #4 REBAR A MINIMUM OF 6" INTO THE CATCH BASIN
7. CONCRETE SPACER BLOCKS SHALL BE USED AT ALL TIMES.



BENCH CONCRETE LINED DITCH SECTION
SHOWING SPLASH HEADWALL



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
CONCRETE LINED DITCH**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

2-07

SCALE:
NONE

DATE:
09/13/11

**PLANS REVIEWED FOR CONSTRUCTION
DEVELOPMENT SERVICES DEPARTMENT – PLANNING DIVISION**

GRADING PLANS - REVIEWED FOR COMPLIANCE WITH THE HILLSIDE DEVELOPMENT GUIDELINES OF THE VALLEJO PLANNING COMMISSION ADOPTED PURSUANT TO CHAPTER 16.54 OF THE VALLEJO MUNICIPAL CODE.

REVIEWED FOR COMPLIANCE WITH PERMIT NO. _____

BY _____

BY _____

NAME _____ CHF. OF PLAN'G
DATE _____ PRINT _____

NAME _____ CHF. OF PLAN'G
DATE _____ PRINT _____

CITY of VALLEJO

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 8-1/2" x 3"

**PLANS REVIEWED FOR CONSTRUCTION
DEPARTMENT of PUBLIC WORKS – ENGINEERING DIVISION**

GRADING PLANS – REVIEWED FOR COMPLIANCE WITH CHAPTER 12.40 OF THE VALLEJO MUNICIPAL CODE.

STREET IMPROVEMENT PLANS – REVIEWED FOR COMPLIANCE WITH CHAPTER 15.06 OF THE VALLEJO MUNICIPAL CODE.

BY _____

BY _____

NAME _____ CITY ENGINEER
DATE _____ PRINT _____

NAME _____ CITY ENGINEER
DATE _____ PRINT _____

R.C.E. _____ EXPR. _____

R.C.E. _____ EXPR. _____

DATE _____

DATE _____

CITY of VALLEJO

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 8-1/2" x 3"

RECORD DRAWING

THIS RECORD PLAN HAS BEEN REVIEWED

BY _____

NAME _____ CITY INSPECTOR
DATE _____ PRINT _____

TITLE _____

DATE _____

SHOWN AT REDUCED SCALE, OVERALL DIMENSIONS TO BE 5-1/2" x 2"

NOTES

1. BLOCK TO BE LOCATED IN LOWER RIGHT HAND CORNER OF SHEET OR (ALTERNATIVELY) IN LOWER RIGHT CORNER OF THE MAIN FIELD AND SHALL BE ORIENTED TO READ FROM THE BOTTOM.
2. SIGNATURE BLOCK SHALL BE PROVIDED ON EACH SHEET FOR THE PROJECT ENGINEER.
3. EACH REVISION SHALL BE REVIEWED AND INITIATED BY THE CITY ENGINEER.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
CITY APPROVAL BLOCKS**

APPROVED BY:

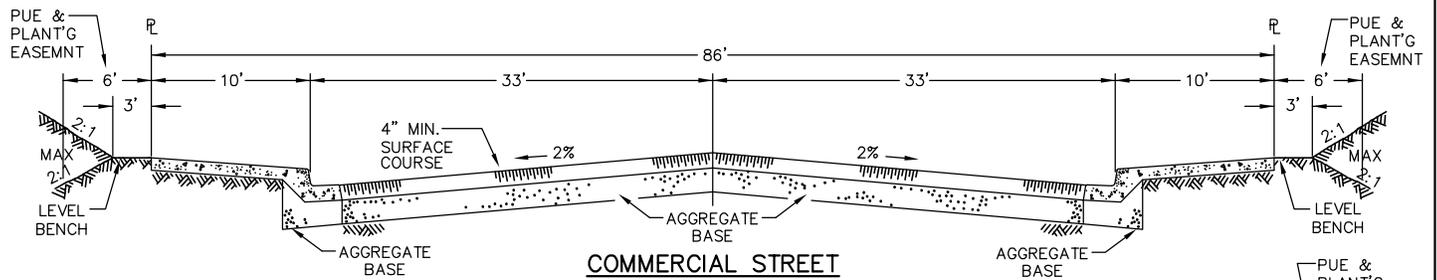
[Handwritten Signature]

DIRECTOR OF PUBLIC WORKS

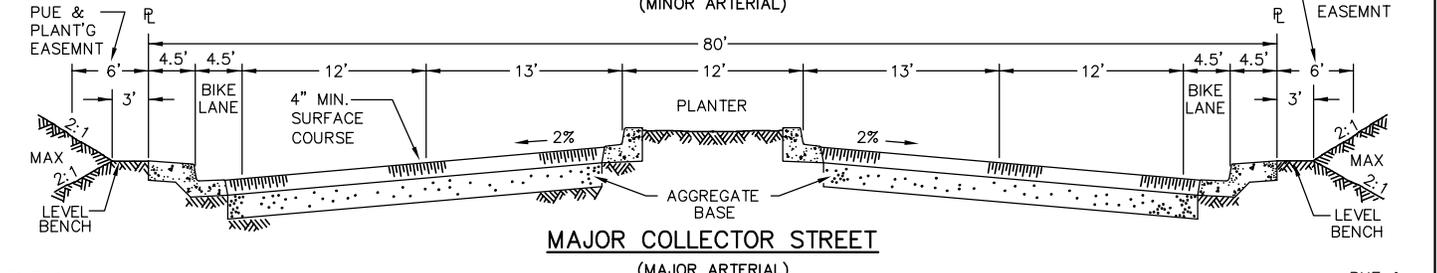
DRAWING NO:
3-01

SCALE:
NONE

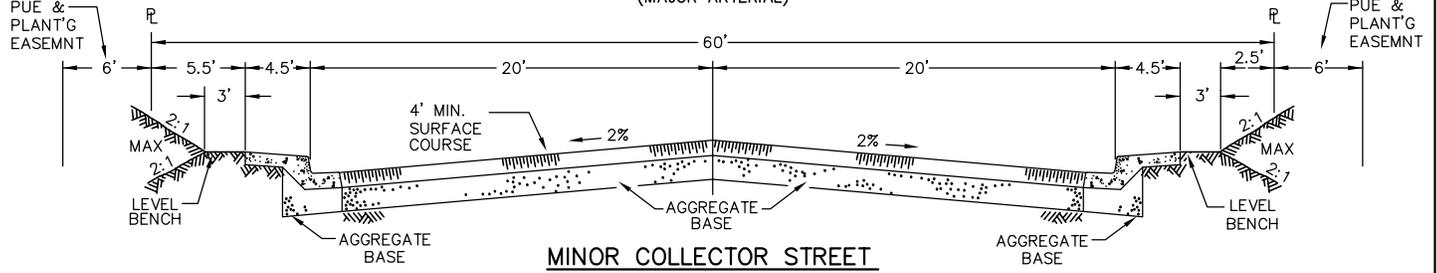
DATE:
09/13/11



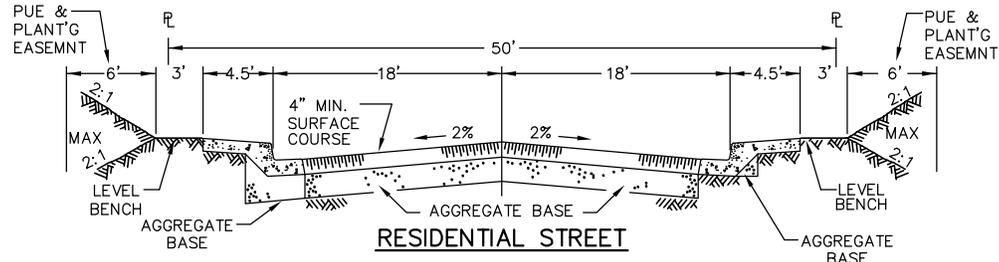
COMMERCIAL STREET
(MINOR ARTERIAL)



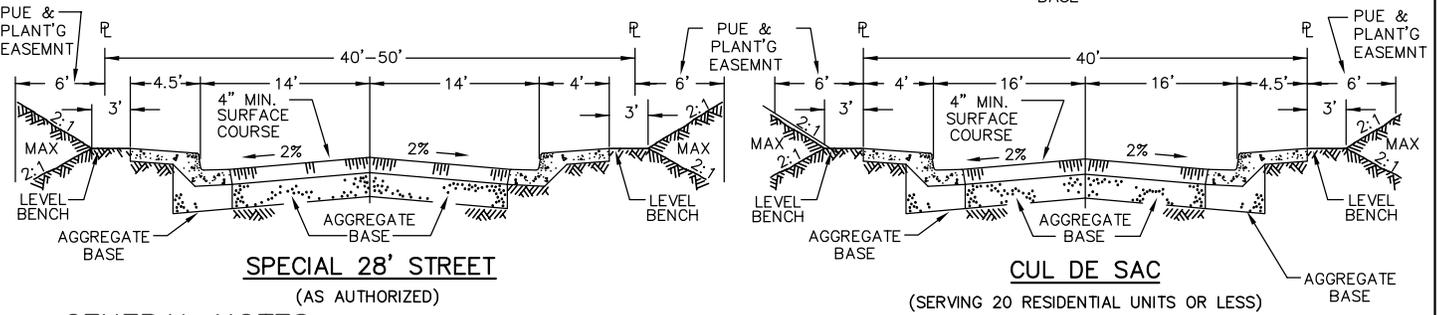
MAJOR COLLECTOR STREET
(MAJOR ARTERIAL)



MINOR COLLECTOR STREET



RESIDENTIAL STREET



SPECIAL 28' STREET
(AS AUTHORIZED)

CUL DE SAC
(SERVING 20 RESIDENTIAL UNITS OR LESS)

GENERAL NOTES:

1. CROSS-FALL SHALL NOT EXCEED 2% FROM CURB TO CURB EXCEPT WITH THE APPROVAL OF THE PUBLIC WORKS DIRECTOR.
2. IN ADDITION TO THE SIDEWALK WIDTHS SHOWN ON THE STREET CROSS-SECTIONS, 6 ft. SIDEWALKS SHALL BE INSTALLED WHERE DESIGNATED IN BLOCKS WITHIN 1000 ft. OF SCHOOLS, PARKS, SHOPPING OR OTHER AREAS THAT ATTRACT PEDESTRIAN TRAFFIC.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD STREET IMPROVEMENT
CROSS-SECTIONS**

APPROVED BY:

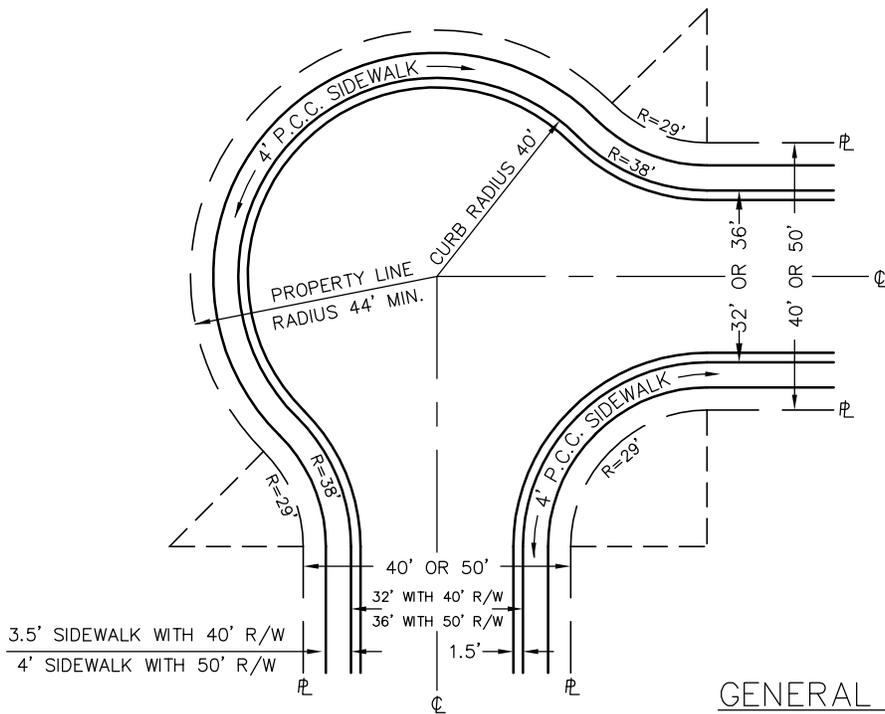


DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-02

SCALE:
NONE

DATE:
09/13/11

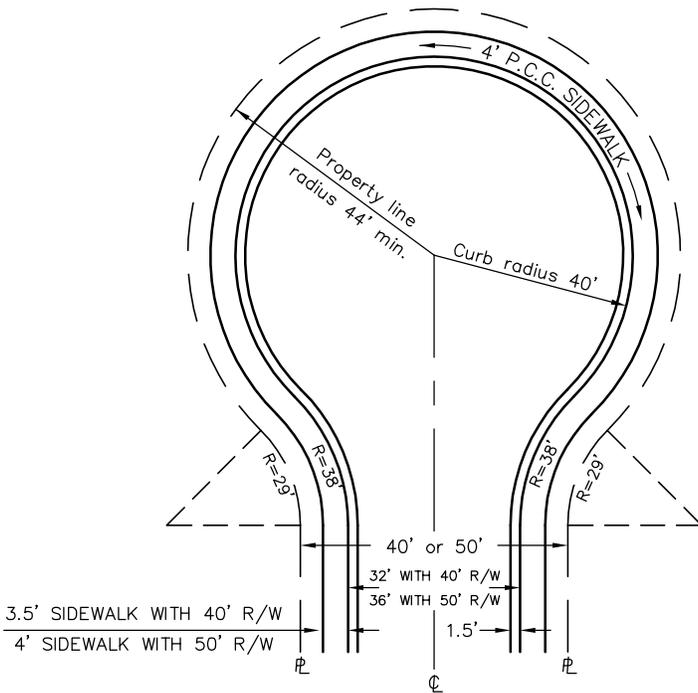


HALF CUL DE SAC

GENERAL NOTES

MINIMUM CUL DE SAC STREET R/W WIDTHS

- (1) 20 LOTS OR LESS WITH 40' R/W AND 32' STREET.
- (2) MORE THAN 20 LOTS WITH 50' R/W AND 36' STREET.
- (3) SIDEWALK WIDTH ON 40' R/W SHALL BE 4 FEET.
- (4) SIDEWALK WIDTH ON 50' R/W SHALL BE 4 FEET.



CUL DE SAC



CITY OF VALLEJO STANDARD DETAIL

**STANDARD CUL DE SAC AND
HALF CUL DE SAC DETAILS**

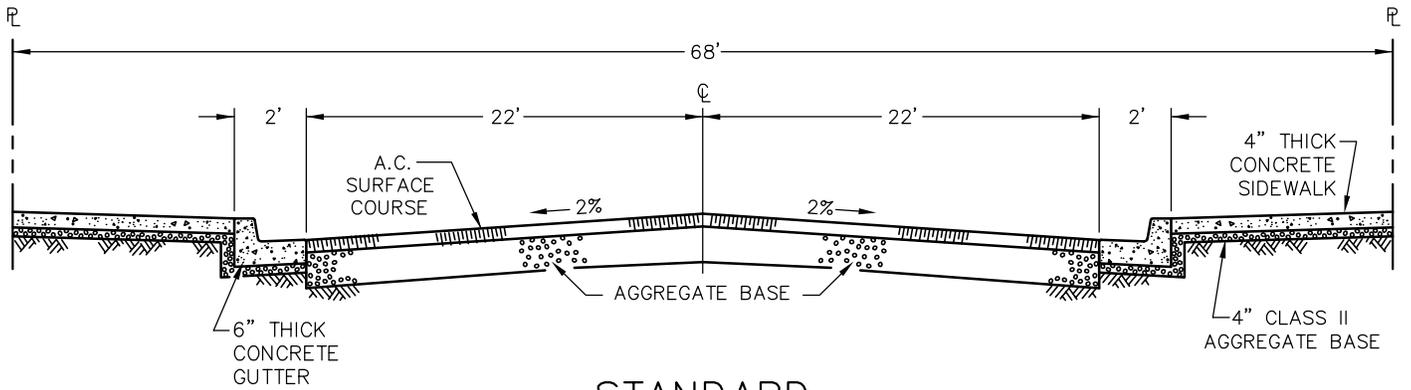
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

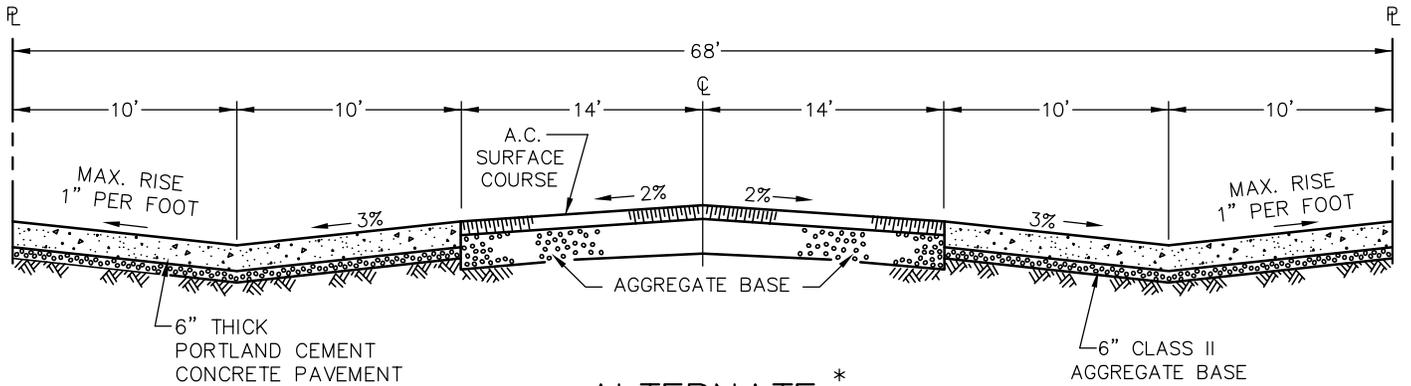
DRAWING NO:
3-03

SCALE:
NONE

DATE:
09/13/11



STANDARD



ALTERNATE *

NOTES

1. PAVEMENT THICKNESS SHALL VARY DEPENDING ON TYPE OF SUBGRADE.
2. SOIL TESTS SHALL BE MADE, AND DESIGN BASED ON RESULTS OF TESTS IN ACCORDANCE WITH SPECIFICATIONS.
3. INDUSTRIAL STREETS SHALL HAVE A MINIMUM OF 3" A.C. SURFACE COURSE.
- * 4. SUBJECT TO APPROVAL BY CITY ENGINEER.



CITY OF VALLEJO STANDARD DETAIL

**NORMAL INDUSTRIAL STREET
SERVING ABUTTING PROPERTY**

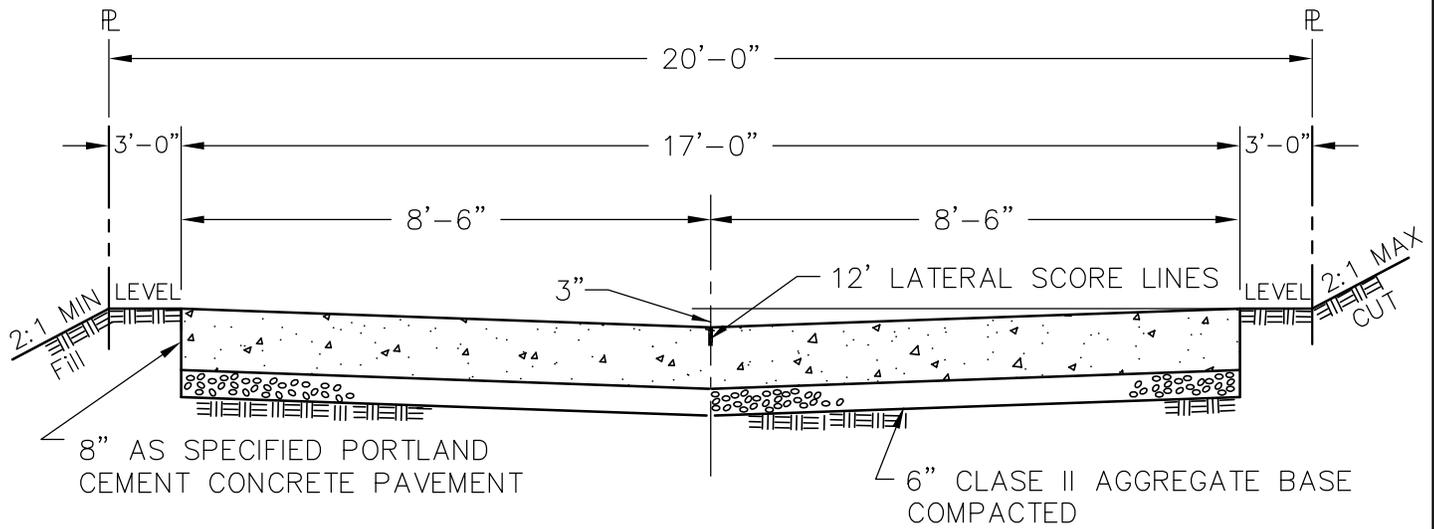
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

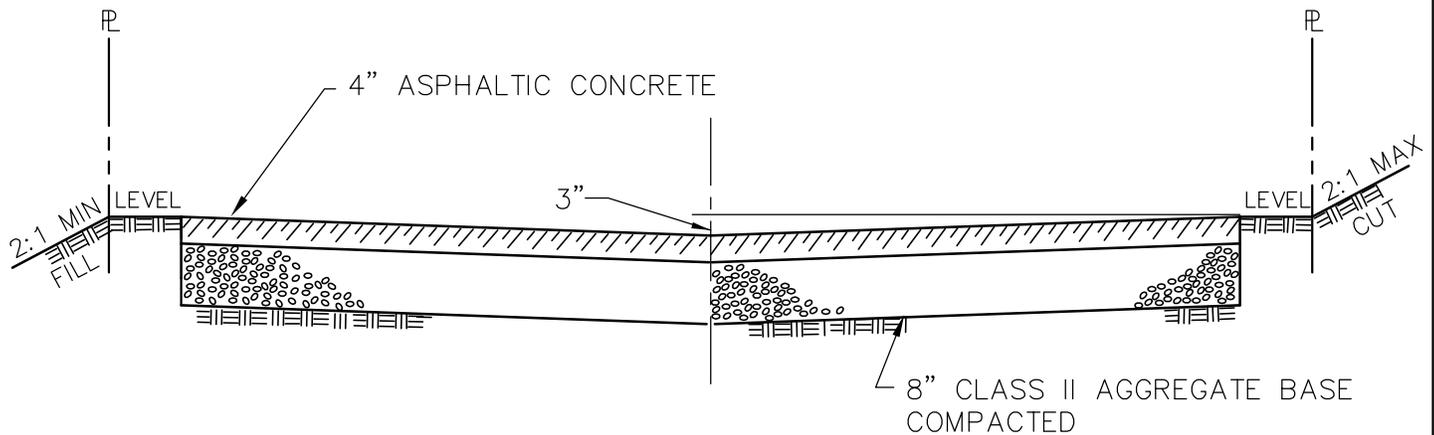
DRAWING NO:
3-04

SCALE:
NONE

DATE:
09/13/11



CROSS-SECTION OF ALLEY PAVEMENT
FOR HEAVILY TRAVELED AND
COMMERCIAL AREAS



CROSS-SECTION OF ALLEY PAVEMENT
FOR RESIDENTIAL AREAS WHERE
DRAINAGE AND TRAFFIC PERMIT

NOTES:

1. REMOVE ALL HEADERS, STAKES, AND OTHER WOOD UPON COMPLETION OF CONCRETE PAVEMENT



CITY OF VALLEJO STANDARD DETAIL

**STANDARD ALLEY PAVEMENT
CROSS - SECTION**

APPROVED BY:

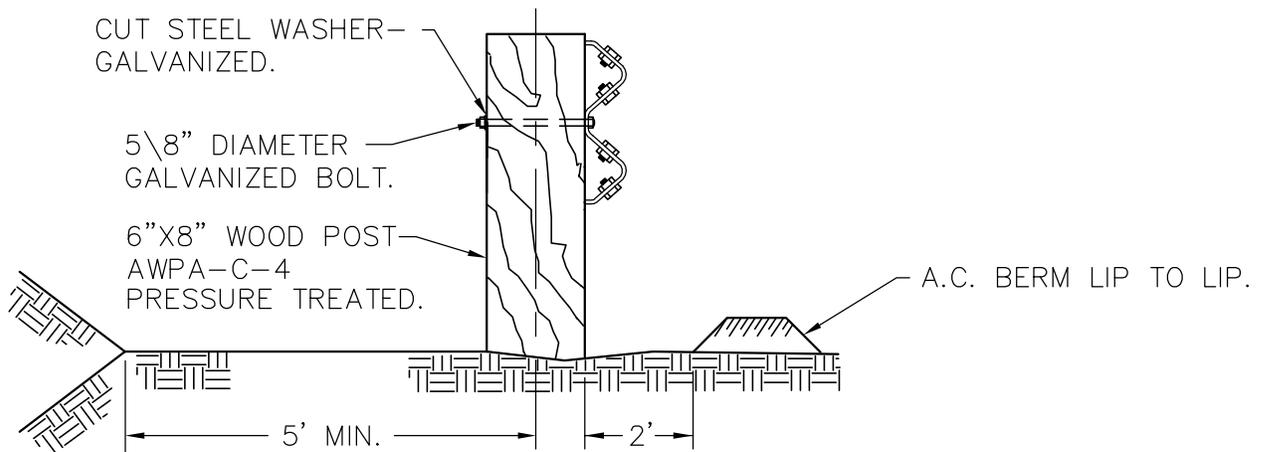
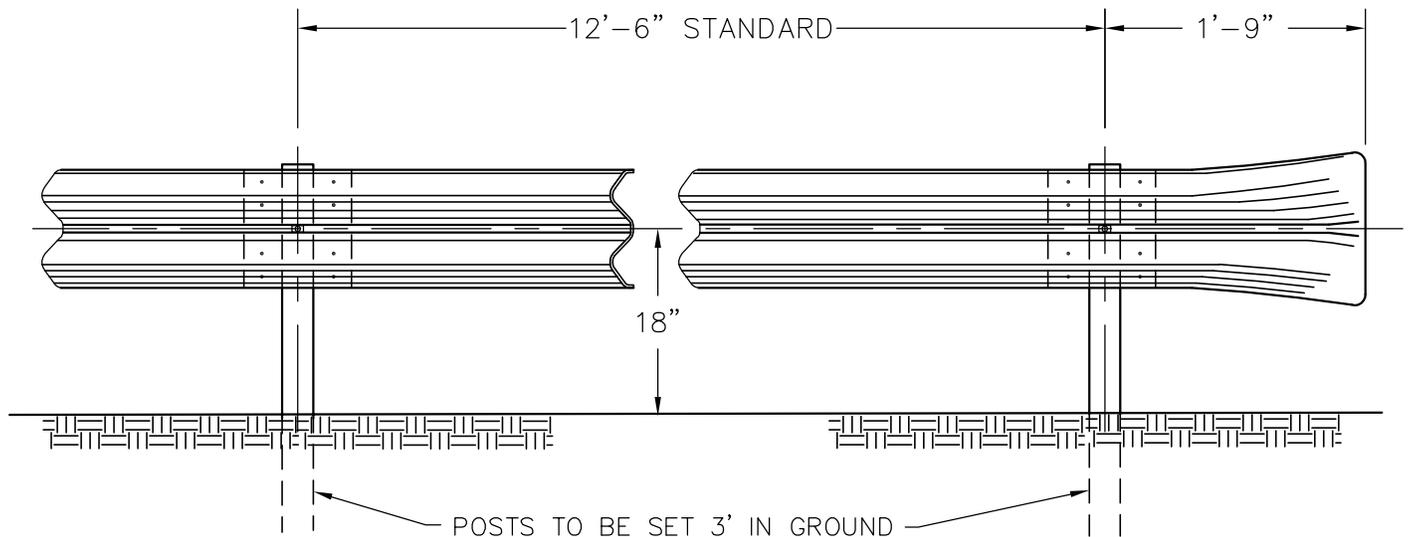
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-05

SCALE:
NONE

DATE:
09/13/11



NOTES:

1. THE BARRICADE SHALL EXTEND ACROSS THE ENTIRE STREET, INCLUDING SIDEWALKS.
2. BARRICADE SHALL BE "ARMCO FLEX-BEAM" OR EQUIVALENT CROSS MEMBER WITH END PIECES MOUNTED ON 6"X8" PRESSURE-TREATED WOOD POSTS. POSTS TO BE SET 3' IN GROUND.
3. THE CROSS MEMBER AND END PIECES SHALL BE PRIMED IN ACCORDANCE WITH THE STATE STANDARD SPECIFICATIONS SECTION 91-2.07, CURRENT ISSUE, AND PAINTED IN ACCORDANCE WITH STATE STANDARD SPECIFICATIONS SECTION 91-2.09, CURRENT ISSUE.
4. MOUNT STANDARD REFLECTOR AT CENTER OF CROSS-MEMBER.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
STREET BARRICADE**

APPROVED BY:

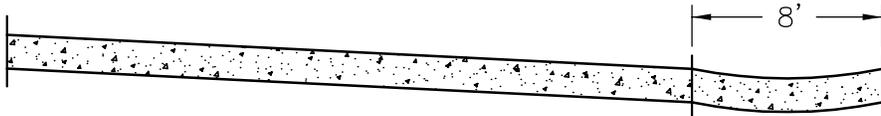
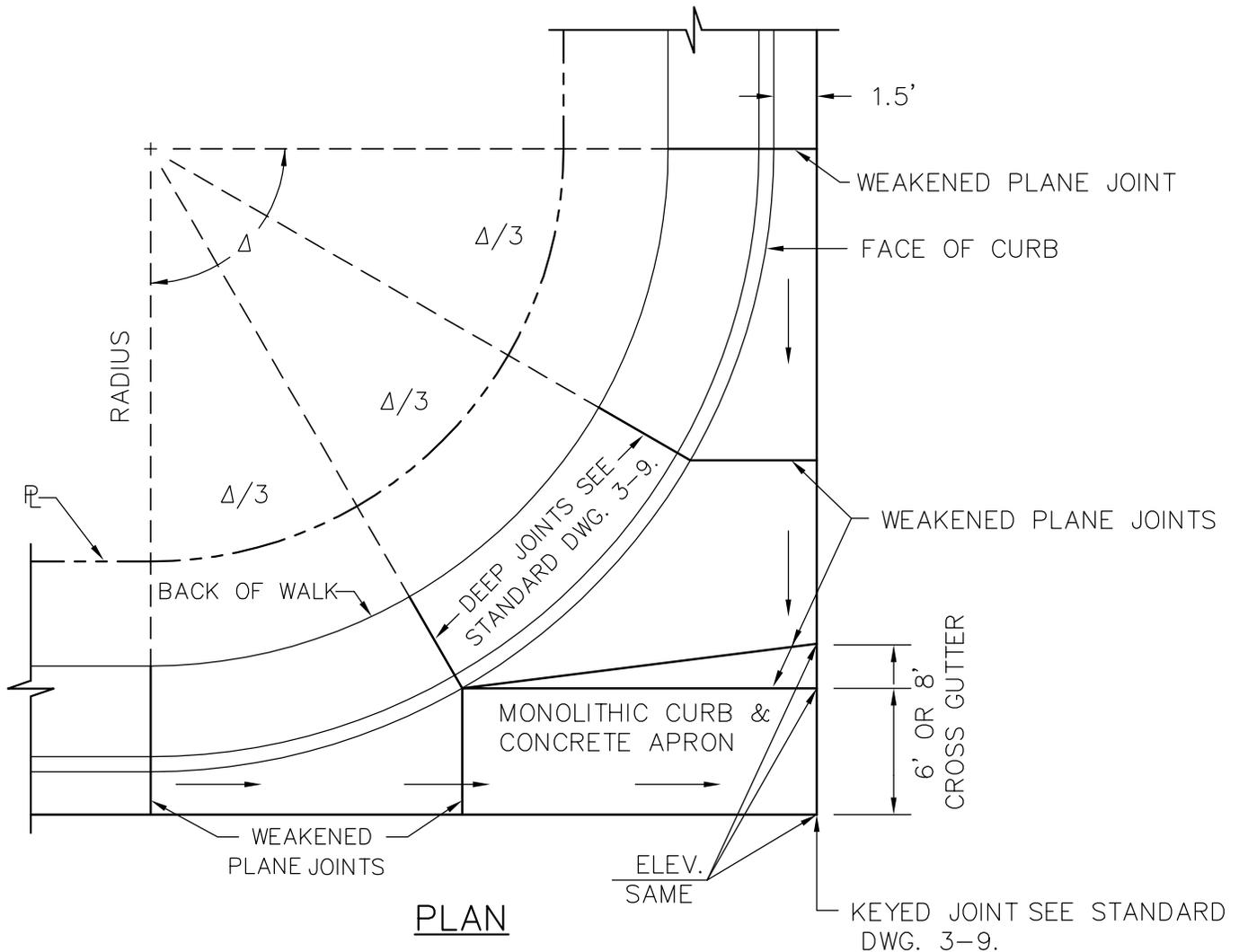
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-06

SCALE:
NONE

DATE:
09/13/11

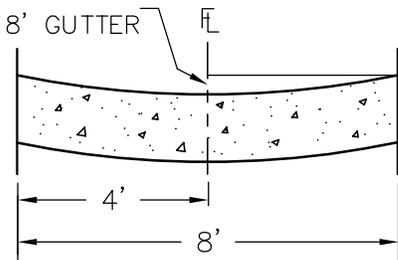


KEYED JOINT SEE STANDARD DWG. 3-9.

NOTES

1. CURB RAMPS MUST BE INSTALLED WITHIN RETURN AREA. SEE STANDARD DWG. 3-17.
2. ALL APRONS SHALL BE CLASS "B" P.C.C. 7-1/2" THICK THROUGHOUT, OVER MIN. 2" OF 3/4" CLASS II A.B.
3. BROOM FINISH UNLESS OTHERWISE DIRECTED BY ENGINEER.
4. USE PIGMENTED SEALING COMPOUND FOR CURING.
5. CITY DISCOURAGES USE OF CROSS GUTTER AND STD. APRON. TO INSTALL CROSS GUTTER, SPECIAL APPROVAL FROM CITY ENGINEER IS REQUIRED.

0.06' FOR 6' GUTTER
0.08' FOR 8' GUTTER



CROSS GUTTER PROFILES



CITY OF VALLEJO STANDARD DETAIL

STANDARD APRON AND JOINT DETAILS

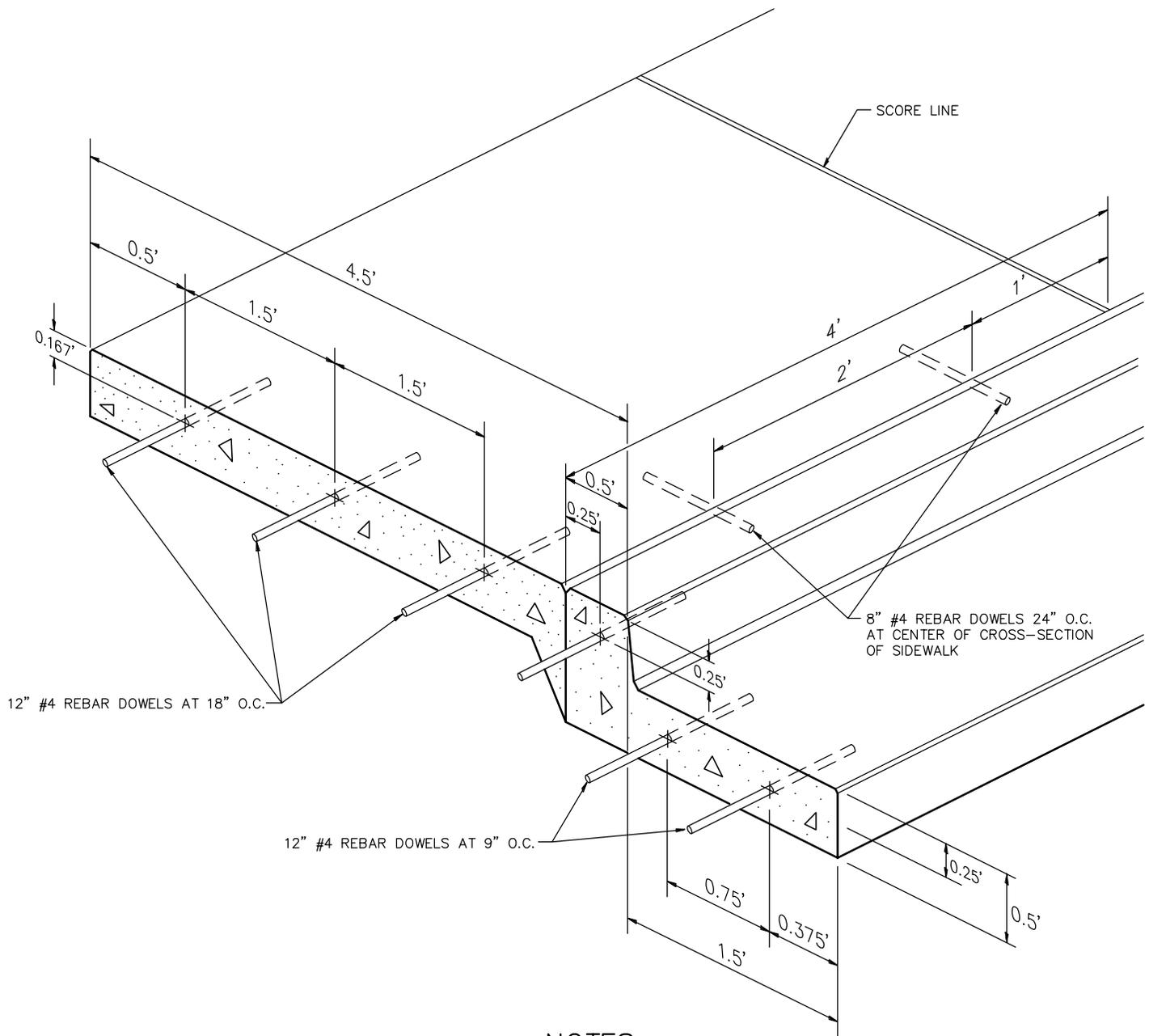
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-07

SCALE:
NONE

DATE:
09/13/11



NOTES

1. DOWELS SHALL BE INSTALLED AS SHOWN BETWEEN NEW SIDEWALK AND EXISTING CURB AND GUTTER, OR VICE VERSA.
2. DOWELS SHALL BE INSTALLED AS SHOWN AT BOTH ENDS OF NEW IMPROVEMENTS AS THEY TIE INTO EXISTING SIDEWALK, AND/OR CURB AND GUTTER. (EXCEPTION - SEE NOTE 3)
3. DOWELS SHALL NOT BE INSTALLED WHERE AN EXPANSION JOINT EXISTS, OR IS REQUIRED. EXISTING EXPANSION JOINT SHALL BE REPLACED AS REQUIRED.
4. SAWCUTS ARE TYPICALLY MADE AT EXISTING SCORE LINES.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
CURB, GUTTER, & SIDEWALK
DOWELING DETAIL**

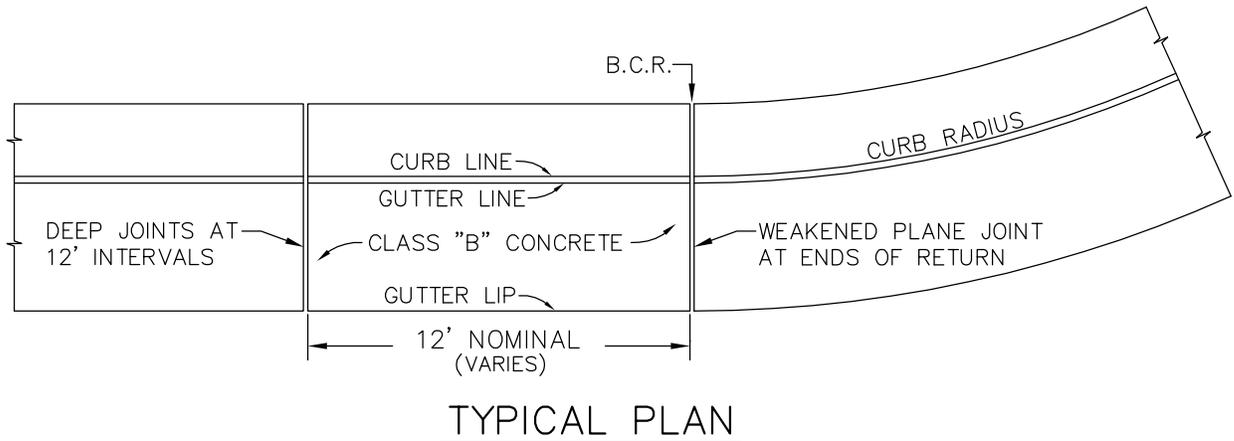
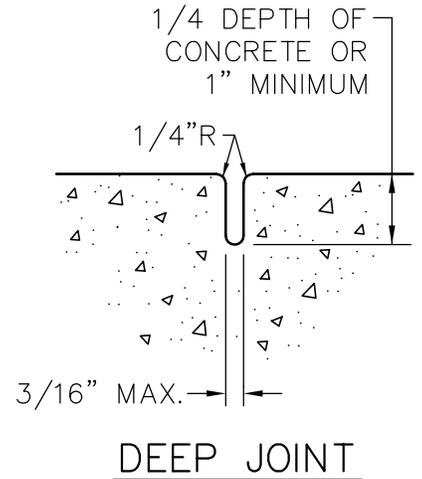
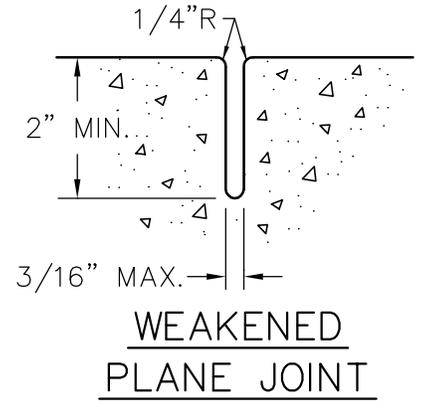
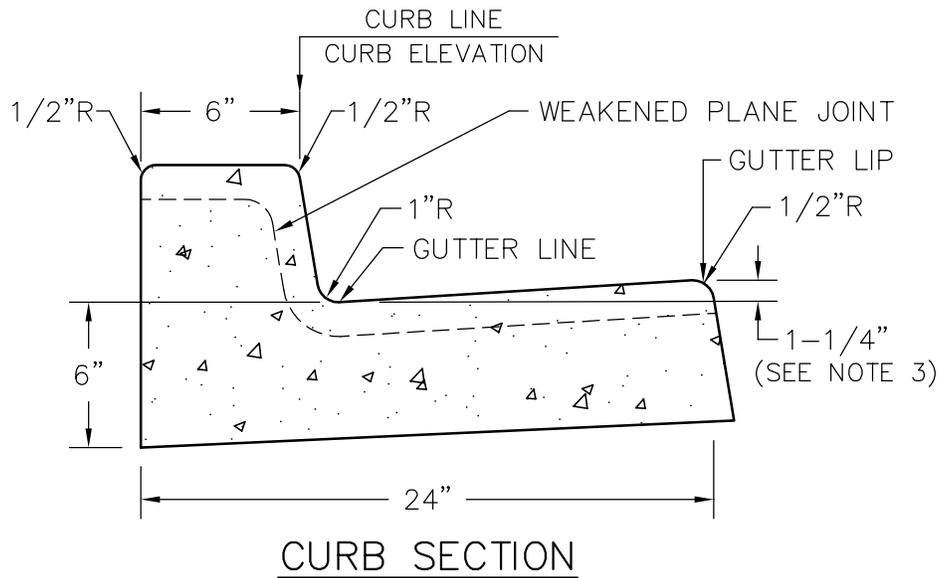
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-08

SCALE:
NONE

DATE:
09/13/11



GENERAL NOTES

1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. USE PIGMENTED SEALING COMPOUND FOR CURING.
3. EXCEPT WHERE ELEVATIONS SHOWN INDICATE OTHERWISE.



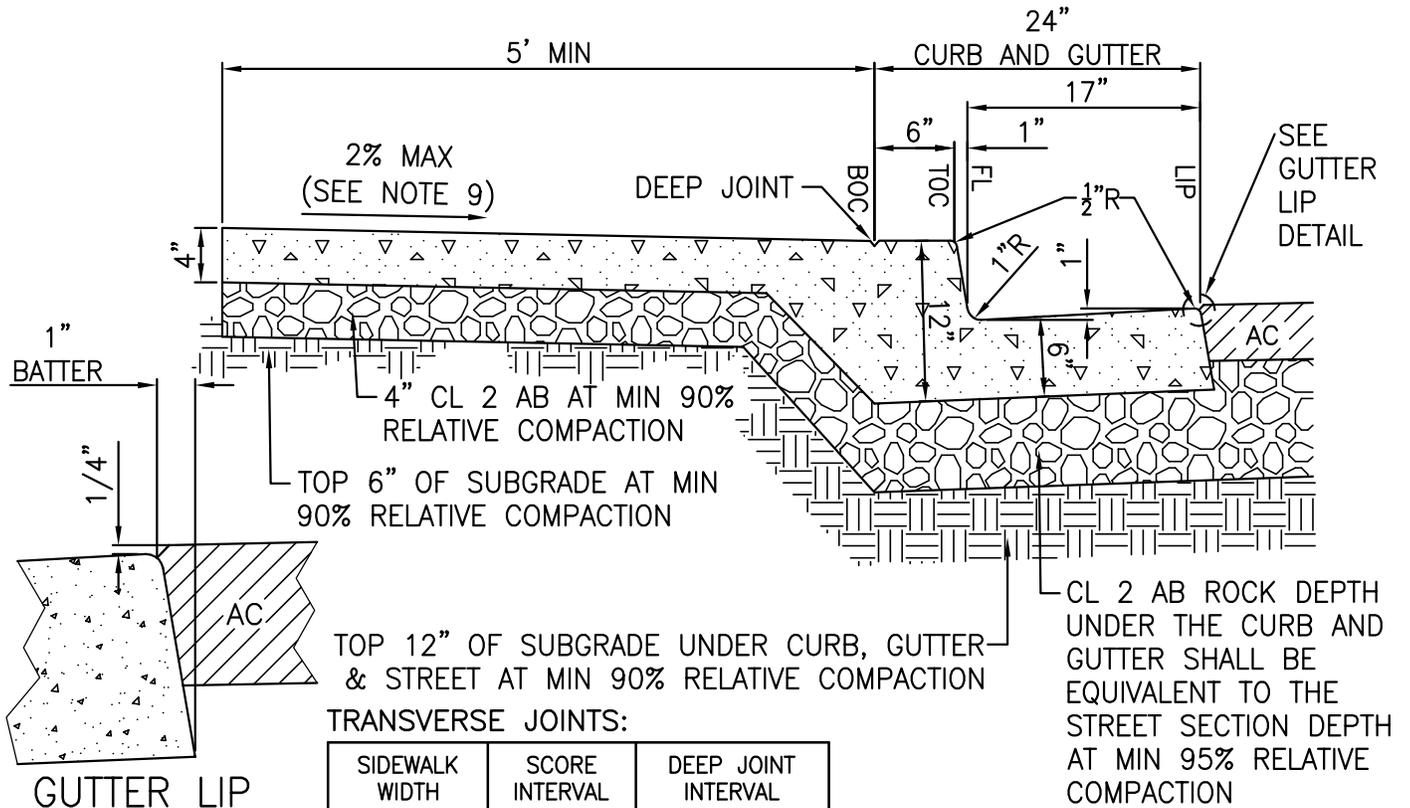
CITY OF VALLEJO STANDARD DETAIL

STANDARD EXPANSION AND OTHER JOINT DETAILS

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-09
SCALE:
NONE
DATE:
09/13/11



**GUTTER LIP
DETAIL**

TRANSVERSE JOINTS:

SIDEWALK WIDTH	SCORE INTERVAL	DEEP JOINT INTERVAL
5'	5'	10'
7'	5'	10'
9.5'	5'*	10'

* SHALL INCLUDE SCORE LINES PERPENDICULAR AND PARALLEL TO TOC.

ABBREVIATIONS

- BOC BACK OF CURB
- FL FLOWLINE
- LIP LIP OF GUTTER
- TOC TOP FACE OF CURB

NOTES:

1. VERTICAL CURB, GUTTER AND SIDEWALK SHALL BE USED ON ALL STREETS IN COMMERCIAL AND INDUSTRIAL DEVELOPMENTS. VERTICAL CURB AND GUTTER SHALL BE USED ON RESIDENTIAL DEVELOPMENTS WHERE THE LOW PROFILE CURB, GUTTER AND SIDEWALK IS NOT REQUIRED PER STANDARD DRAWING 3-12A UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER / DIRECTOR OF PUBLIC WORKS.
2. SCORE LINES SHALL BE 1/4" DEEP.
3. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
4. DEEP JOINTS SHALL ALSO BE LOCATED AT CURB RETURNS, STREET LIGHTS, EACH EDGE OF UTILITY BOXES AND AT EACH END OF DRIVEWAYS AND CENTER OF DRIVEWAY.
5. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELLED TO EXISTING CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
6. IF CURB, GUTTER AND SIDEWALK ARE NOT POURED MONOLITHICALLY, SIDEWALK IS TO BE DOWELLED TO CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
7. REMOVAL OF EXISTING SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
8. FOR SUPERELEVATED STREET SECTION, CURB AND GUTTER MAY REQUIRE MODIFICATION.
9. A PLANTER STRIP AREA MAY BE LOCATED BETWEEN THE CURB AND THE SIDEWALK. THE MINIMUM WIDTH OF THE SIDEWALK SHALL BE 5 FT. THE MINIMUM WIDTH OF THE PLANTER AREA SHALL BE 6' AND SLOPE 2% TOWARD THE STREET. THE PLANTER AREA SHALL BE MAINTAINED BY A LIGHTING AND LANDSCAPE DISTRICT OR HOME OWNER'S ASSOCIATION.
10. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
VERTICAL
CURB, GUTTER, & SIDEWALK**

APPROVED BY:

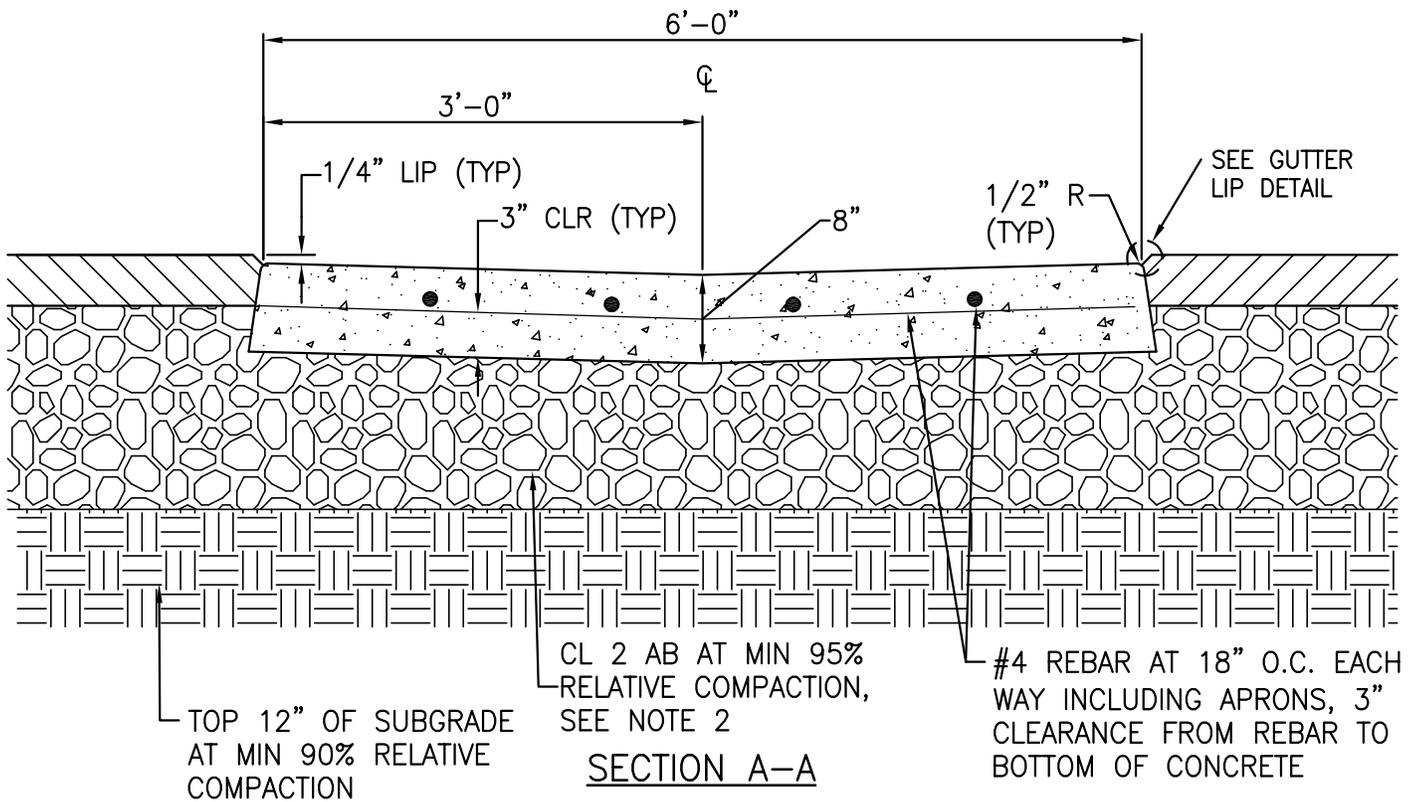
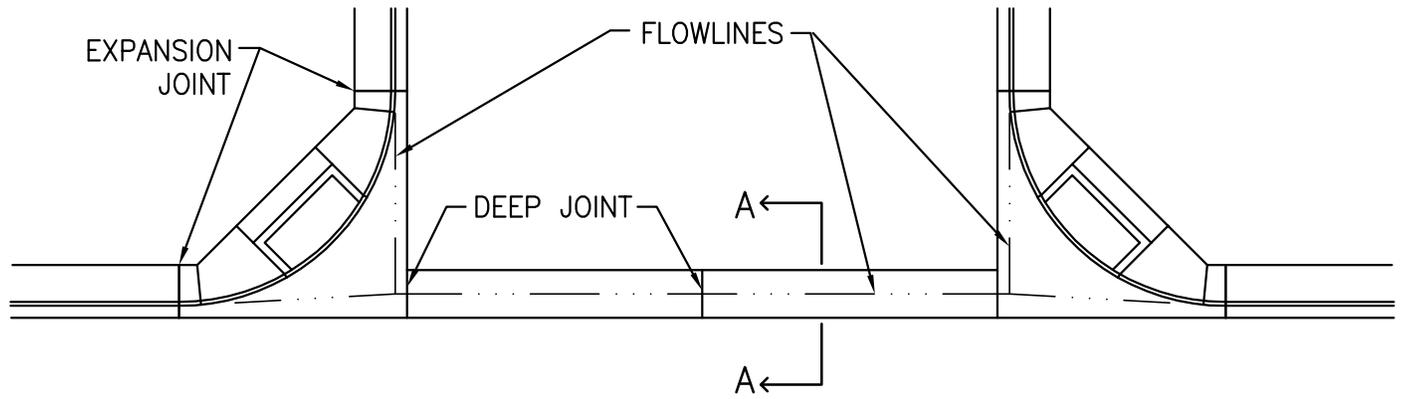
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-10

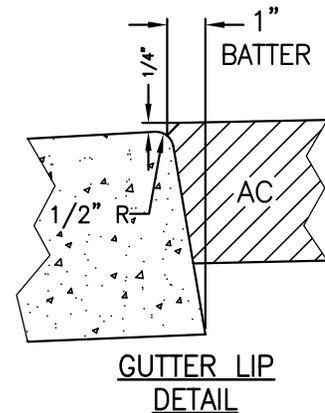
SCALE:
NONE

DATE:
09/13/11



NOTES:

1. MINIMUM SLOPE OF FLOWLINE IS $S=0.005$
2. CL 2 AB THICKNESS SHALL BE EQUAL TO STREET SECTION, BUT IN NO CASE SHALL BE LESS THAN 8".
3. VALLEY GUTTERS SHALL NOT BE ALLOWED ON THROUGH STREETS.
4. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.



CITY OF VALLEJO STANDARD DETAIL

STANDARD VALLEY GUTTER

APPROVED BY:

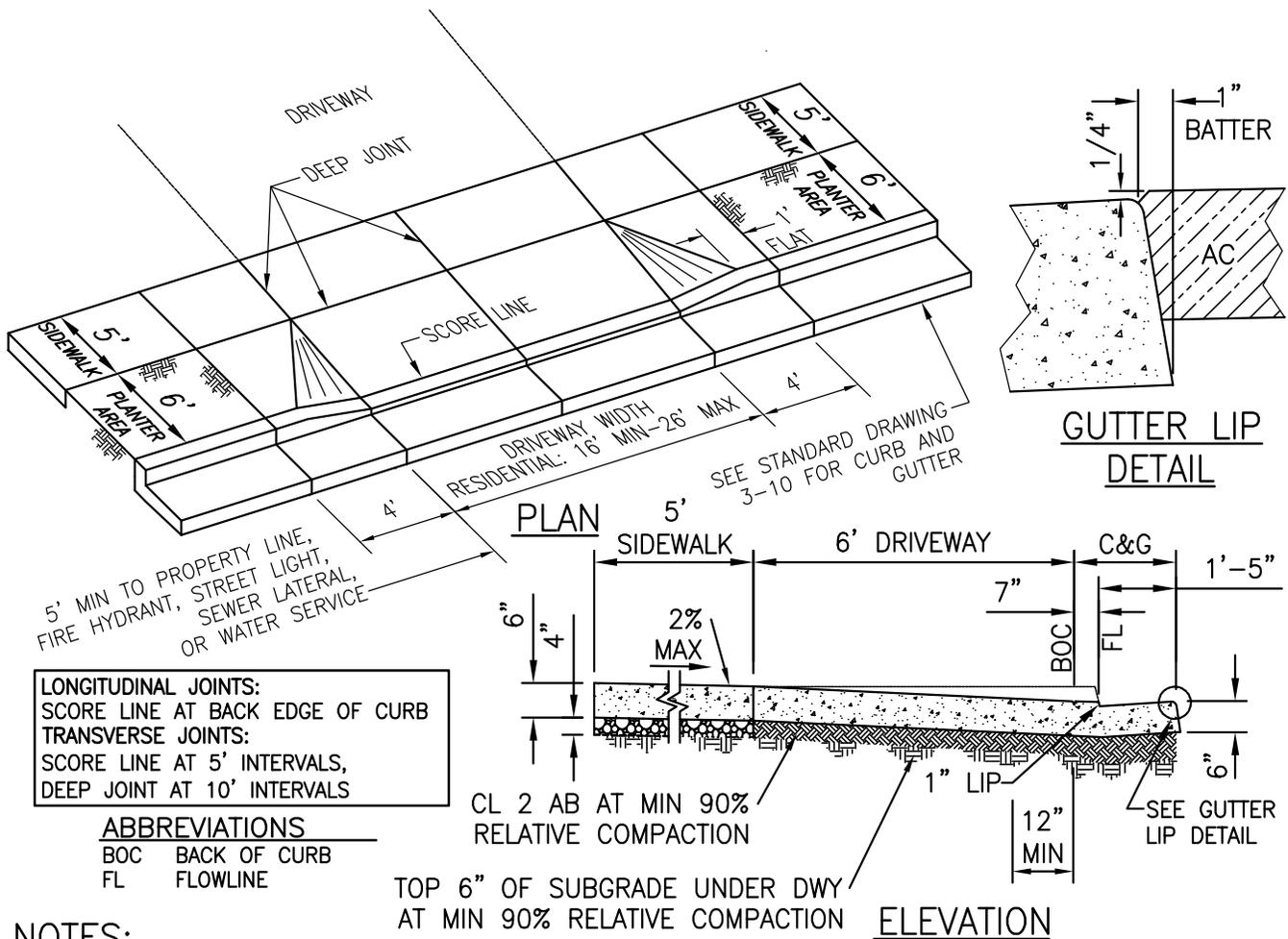
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-11

SCALE:
NONE

DATE:
09/13/11



5' MIN TO PROPERTY LINE,
FIRE HYDRANT, STREET LIGHT,
SEWER LATERAL,
OR WATER SERVICE

LONGITUDINAL JOINTS:
SCORE LINE AT BACK EDGE OF CURB
TRANSVERSE JOINTS:
SCORE LINE AT 5' INTERVALS,
DEEP JOINT AT 10' INTERVALS

ABBREVIATIONS
BOC BACK OF CURB
FL FLOWLINE

TOP 6" OF SUBGRADE UNDER DWY
AT MIN 90% RELATIVE COMPACTION

NOTES:

1. LOW PROFILE CURB, GUTTER AND SIDEWALK SHALL BE USED ON ALL STREETS IN RESIDENTIAL DEVELOPMENTS EXCEPT AS FOLLOWS: 1) WHERE A PLANTER STRIP IS LOCATED BETWEEN THE CURB AND SIDEWALK, 2) ON COLLECTOR STREETS WHERE NO DRIVEWAYS EXIST, OR 3) AT LOCATIONS IDENTIFIED BY THE CITY ENGINEER/DIRECTOR OF PUBLIC WORKS. IN THESE CASES, A VERTICAL CURB SHALL BE INSTALLED PER STANDARD DRAWING 3-10.
2. SCORE LINES SHALL BE 1/4" DEEP.
3. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
4. DEEP JOINTS SHALL ALSO BE LOCATED AT 10 FOOT INTERVALS AND AT CURB RETURNS, AT EACH EDGE OF UTILITY BOXES AND STREET LIGHTS.
5. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELLED TO EXISTING CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
6. REMOVAL OF EXISTING SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
7. SEGMENTS OF THE DRIVEWAY POURED SEPARATELY SHALL BE DOWELLED TO ADJOINING CONCRETE WITH #4 BARS AT 2' O.C.
8. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
9. ANY UTILITY BOX AND LID WITHIN 5 FEET OF THE LIMITS OF THE DRIVEWAY SHALL BE TRAFFIC-RATED.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
RESIDENTIAL DRIVEWAY WITH
SEPERATED SIDEWALK & PLANTER**

APPROVED BY:

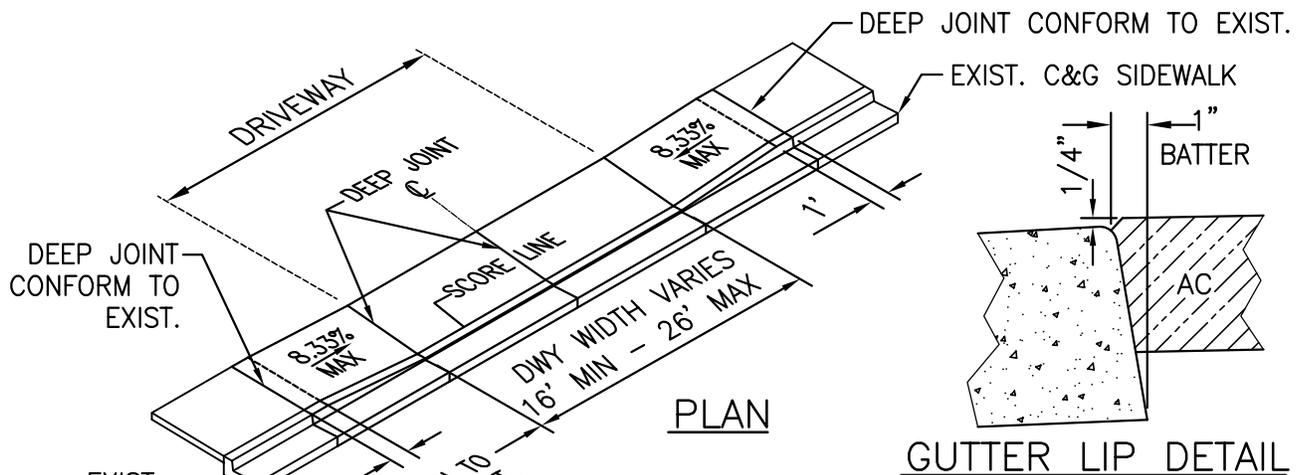


DIRECTOR OF PUBLIC WORKS

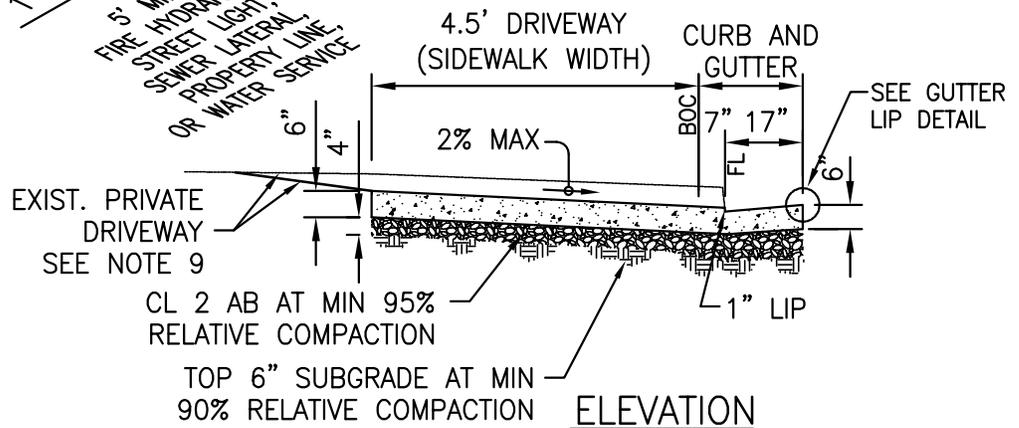
DRAWING NO:
3-12

SCALE:
NONE

DATE:
09/13/11



GUTTER LIP DETAIL



ABBREVIATIONS
 BOC BACK OF CURB
 FL FLOWLINE

NOTES:

1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
2. UNLESS OTHERWISE PERMITTED, REPLACE PAVEMENT PER CITY STANDARD DRAWING 3-20, "EXIST. STREET" A MINIMUM OF 12" BEYOND ALL EDGES OF WORK.
3. SCORE LINE SHALL BE 1/4" DEEP.
4. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
5. DEEP JOINTS SHALL ALSO BE LOCATED AT CURB RETURNS, STREET LIGHTS, AT EACH EDGE OF UTILITY BOXES AND AT EACH END OF DRIVEWAYS AND CENTER OF DRIVEWAY.
6. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELED TO EXIST. CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
7. IF CURB, GUTTER AND SIDEWALK ARE NOT POURED MONOLITHICALLY, SIDEWALK IS TO BE DOWELLED TO CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
8. REMOVAL OF EXIST. SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
9. THE EXIST. PRIVATE DRIVEWAY WILL NEED TO BE MODIFIED TO CONFORM TO NEW ELEVATION OF RETROFIT.
10. ANY UTILITY BOX AND LID WITHIN THE LIMITS OF THE DRIVEWAY SHALL BE TRAFFIC-RATED.

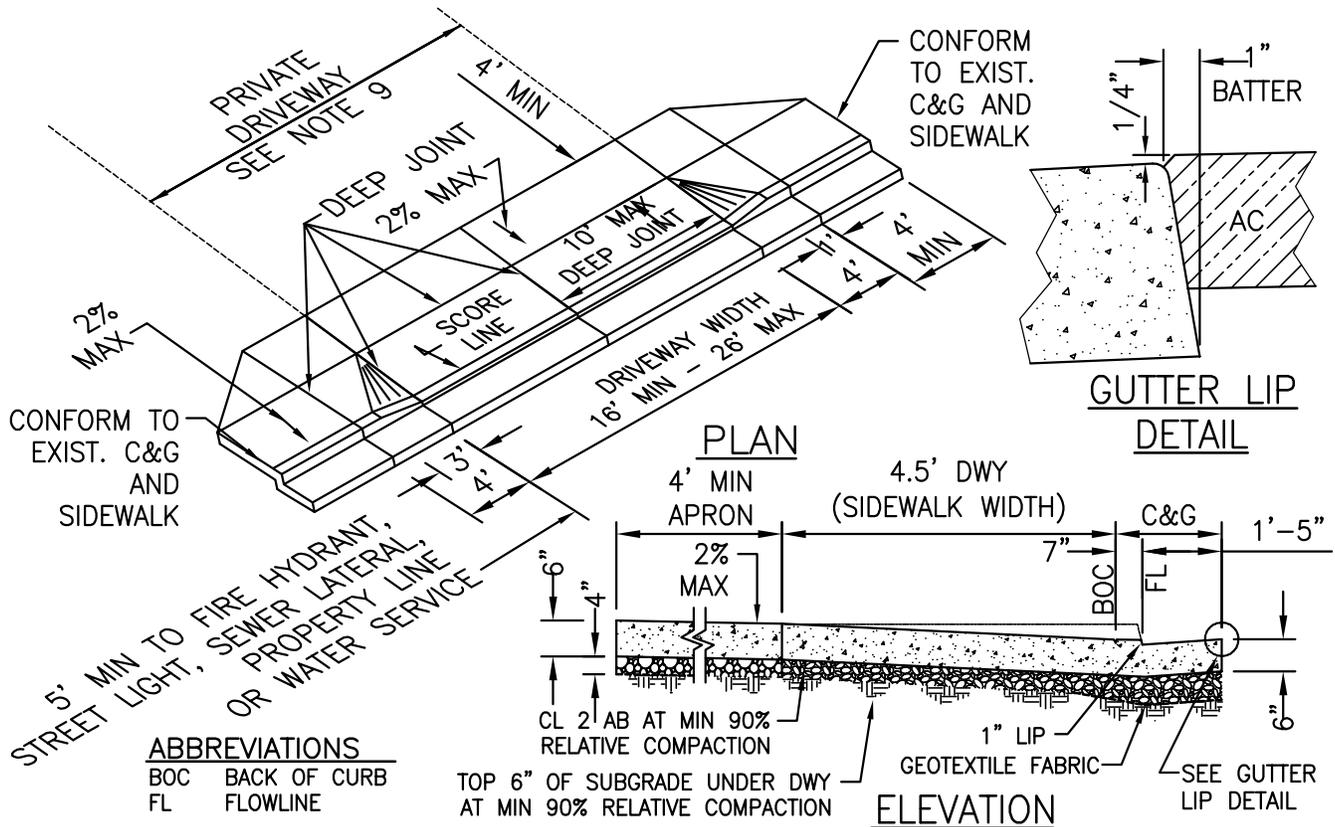


CITY OF VALLEJO STANDARD DETAIL
STANDARD
 RESIDENTIAL DRIVEWAY RETROFIT - TYPE 1
 (ADJOINING VERTICAL CURB & GUTTER)

APPROVED BY:

 DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-13
 SCALE:
 NONE
 DATE:
 09/13/11



NOTES:

1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
2. UNLESS OTHERWISE PERMITTED, REPLACE PAVEMENT PER CITY STANDARD DRAWING 3-20, "EXISTING STREET" A MINIMUM OF 12" BEYOND ALL EDGES OF WORK.
3. SCORE LINES SHALL BE 1/4" DEEP.
4. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
5. DEEP JOINTS SHALL ALSO BE LOCATED AT CURB RETURNS, AT EACH EDGE OF UTILITY BOXES, STREET LIGHTS, AND AT EACH END OF DRIVEWAYS AND CENTER OF DRIVEWAY.
6. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELLED TO EXISTING CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
7. IF CURB, GUTTER AND SIDEWALK ARE NOT POURED MONOLITHICALLY, SIDEWALK IS TO BE DOWELLED TO CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
8. REMOVAL OF EXISTING SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
9. THE EXISTING PRIVATE DRIVEWAY WILL NEED TO BE MODIFIED TO CONFORM TO NEW ELEVATION OF RETROFIT AND MAY REQUIRE ADDITIONAL RIGHT OF WAY.
10. THIS OPTION IS ONLY ALLOWED IF THERE IS SUFFICIENT RIGHT OF WAY AND IF APPROVED BY THE DIRECTOR OF PUBLIC WORKS.
11. ANY UTILITY BOX OR LID LOCATED WITHIN 5 FEET OF THE LIMITS OF THE DRIVEWAY SHALL BE TRAFFIC-RATED.



CITY OF VALLEJO STANDARD DETAIL

STANDARD

RESIDENTIAL DRIVEWAY RETROFIT - TYPE 2

(ADJOINING VERTICAL CURB & GUTTER)

APPROVED BY:

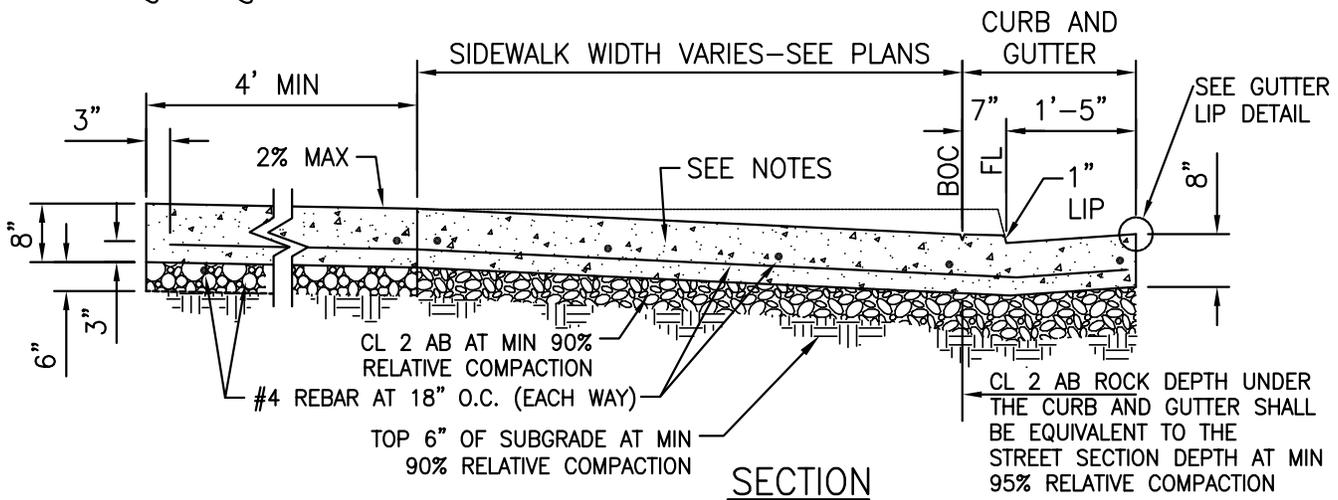
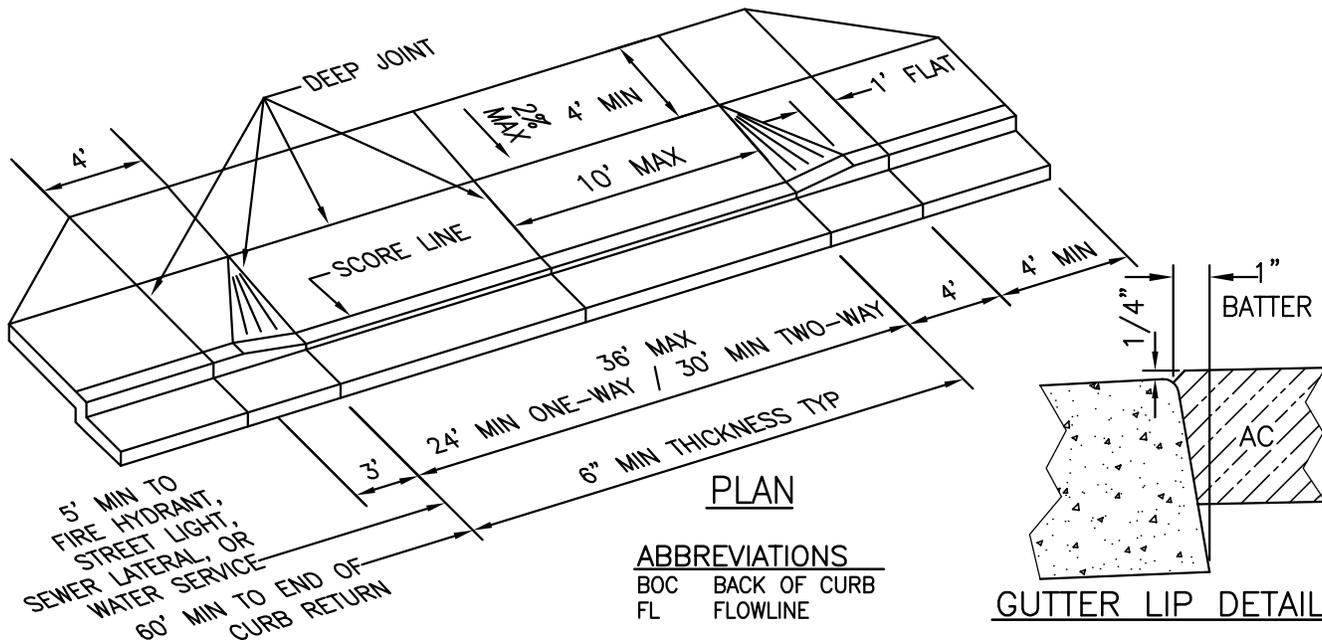
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-14

SCALE:
NONE

DATE:
09/13/11



NOTES:

1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
2. UNLESS OTHERWISE PERMITTED, REPLACE PAVEMENT PER CITY STANDARD DRAWING 3-20A, "EXISTING STREET" A MINIMUM OF 12" BEYOND ALL EDGES.
3. SCORE LINES SHALL BE 1/4" DEEP.
4. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
5. DEEP JOINTS SHALL ALSO BE LOCATED AT CURB RETURNS, AT EACH EDGE OF UTILITY BOXES, STREET LIGHTS, AND AT EACH END OF DRIVEWAYS AND CENTER OF DRIVEWAY.
6. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELLED TO EXISTING CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
7. REMOVAL OF EXISTING SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
8. EXISTING COMMERCIAL DRIVEWAYS MAY NEED TO BE MODIFIED TO CONFORM TO NEW ELEVATION OF RETROFIT.
9. ANY UTILITY BOX OR LID WITHIN 5 FEET OF THE LIMITS OF THE DRIVEWAY SHALL BE TRAFFIC-RATED.



CITY OF VALLEJO STANDARD DETAIL

STANDARD
COMMERCIAL DRIVEWAY

APPROVED BY:

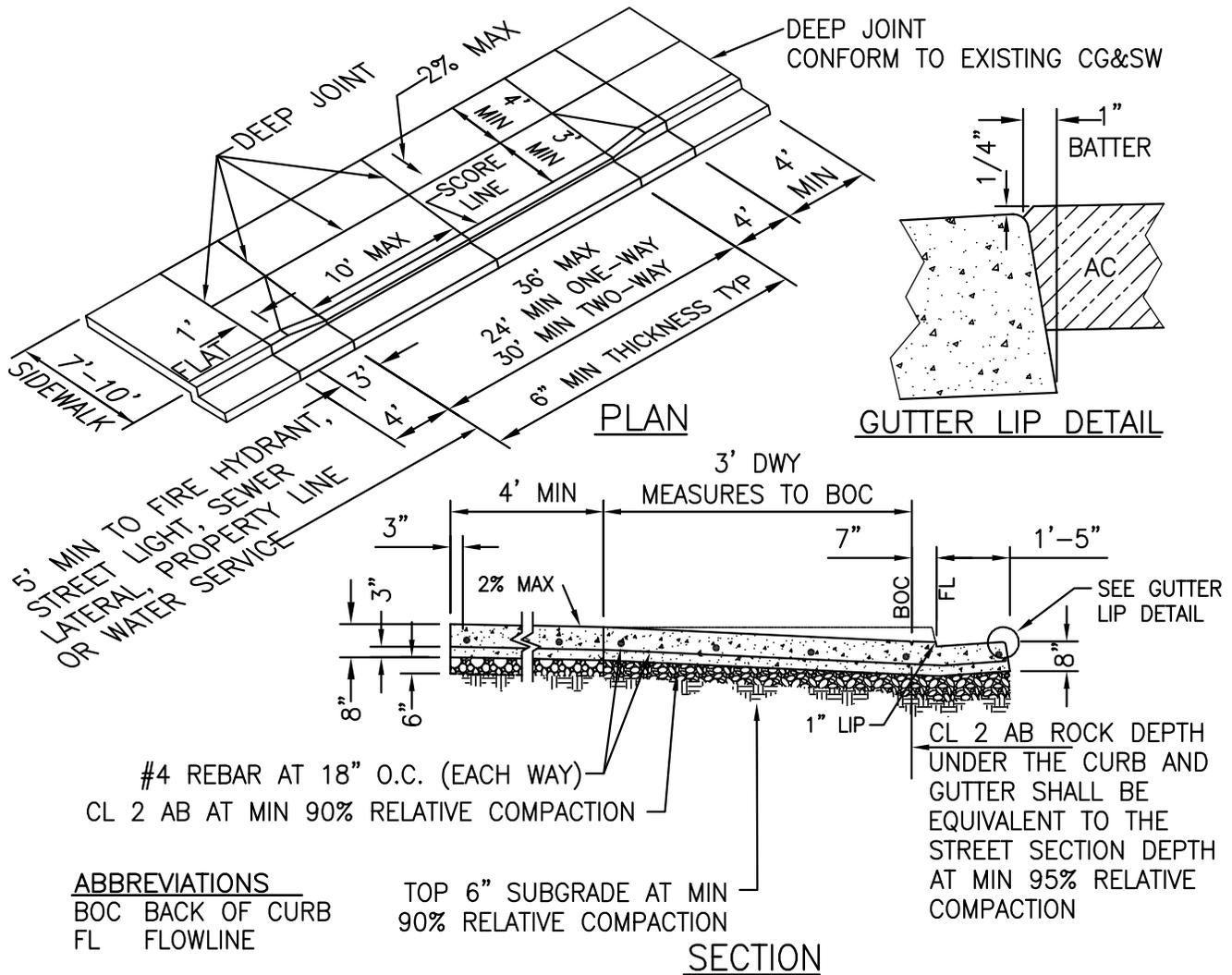
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-15

SCALE:
NONE

DATE:
09/13/11



NOTES:

1. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.
2. UNLESS OTHERWISE PERMITTED, REPLACE PAVEMENT PER CITY STANDARD DRAWING 3-20A, "EXISTING STREET" A MINIMUM OF 12" BEYOND ALL EDGES.
3. ANY CURB, GUTTER AND SIDEWALK AREA TO BE REPLACED SHALL BE DOWELLED TO EXISTING CURB WITH #4 REBAR AT 2' O.C., MIN 9" LONG WITH 3" MIN EMBEDMENT.
4. REMOVAL OF EXISTING SIDEWALK, CURB OR GUTTER TO BE MADE TO NEAREST SCORE LINE OR DEEP JOINT.
5. SCORE LINES SHALL BE 1/4" DEEP.
6. DEEP JOINTS SHALL BE 1" MIN DEEP EXTENDING THROUGH CURB AND GUTTER.
7. DEEP JOINTS SHALL ALSO BE LOCATED AT CURB RETURNS, AT EACH EDGE OF UTILITY BOXES, STREET LIGHTS AND AT EACH END OF DRIVEWAYS AND CENTER OF DRIVEWAY.



CITY OF VALLEJO STANDARD DETAIL

STANDARD
COMMERCIAL DRIVEWAY RETROFIT

APPROVED BY:

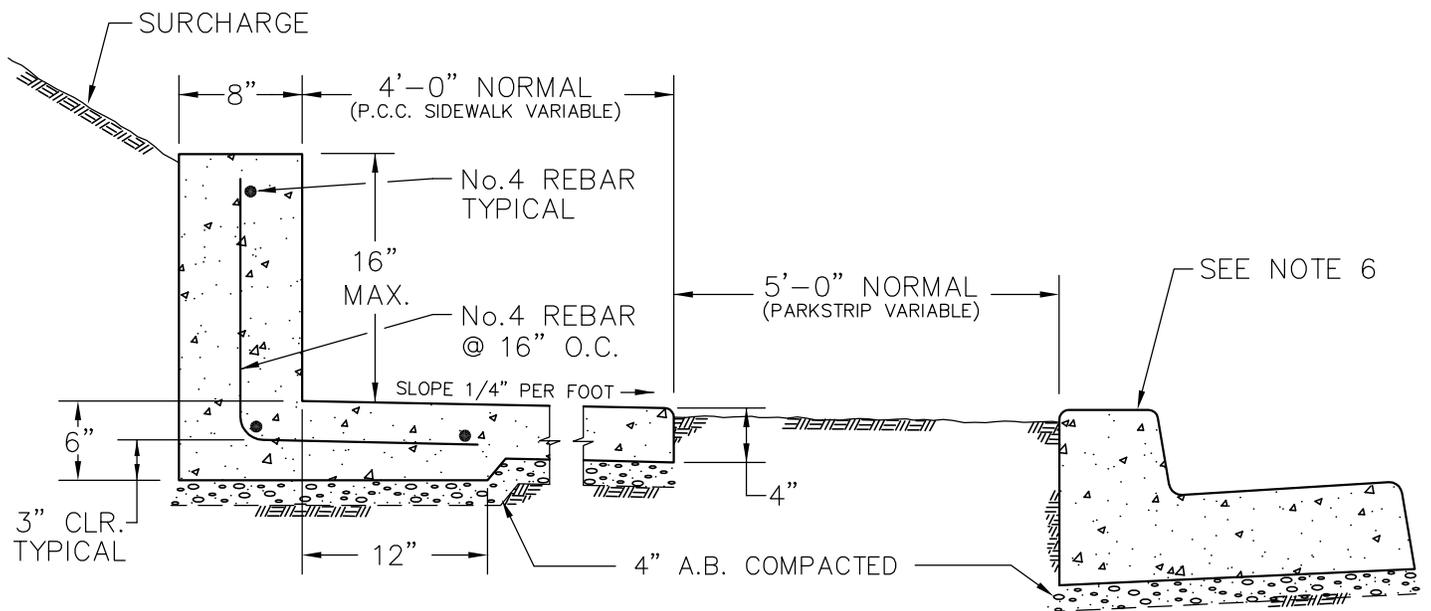
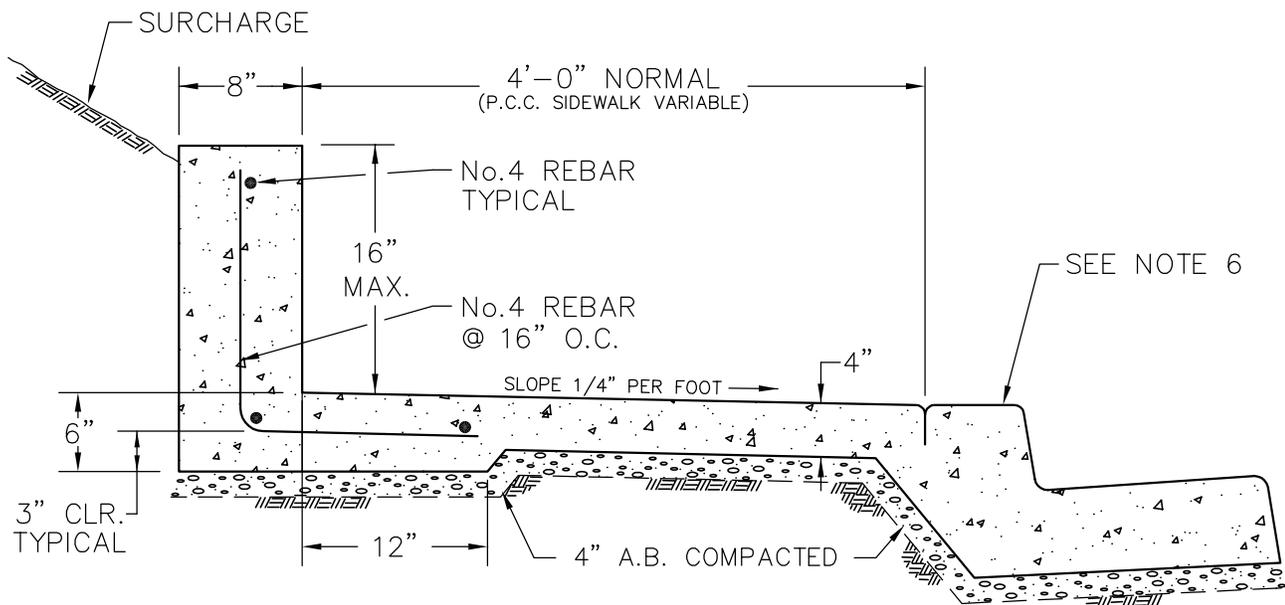


DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-16

SCALE:
NONE

DATE:
09/13/11



GENERAL NOTES

1. BROOM FINISH UNLESS OTHERWISE DIRECTED.
2. TOOL SCORE LINES EVERY 4'. LONGITUDINAL SCORE LINES TO SUIT CONDITIONS OR AS DIRECTED BY ENGINEER, 16 SQ. FT. MAXIMUM.
3. USE PIGMENTED SEALING COMPOUND FOR CURING.
4. ALL #4 REBAR SHALL BE GRADE 40 OR BETTER.
5. FOR STANDARD CURB, GUTTER, AND SIDEWALK DETAILS SEE STANDARD DRAWING #3-10.
6. REBAR IS NOT REQUIRED FOR CURB WALL, UNLESS THE WALL IS SURCHARGED



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
MONOLITHIC CURB WALL**

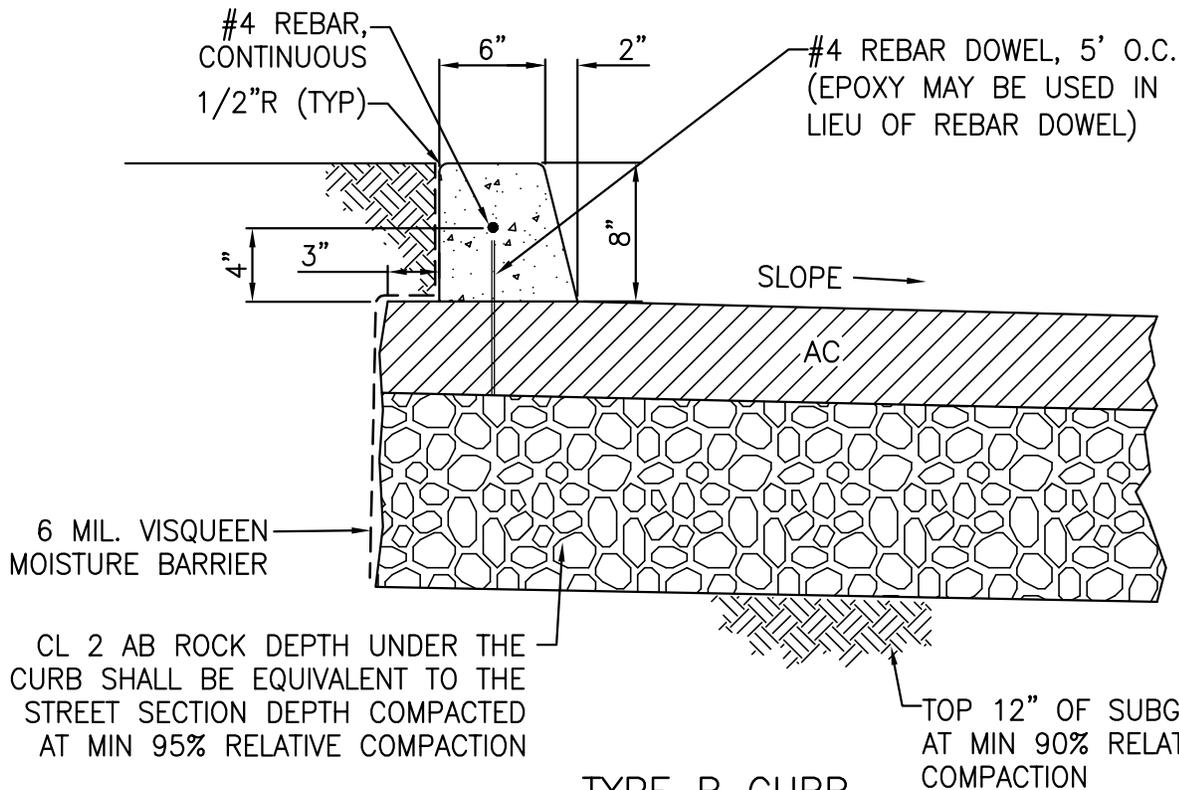
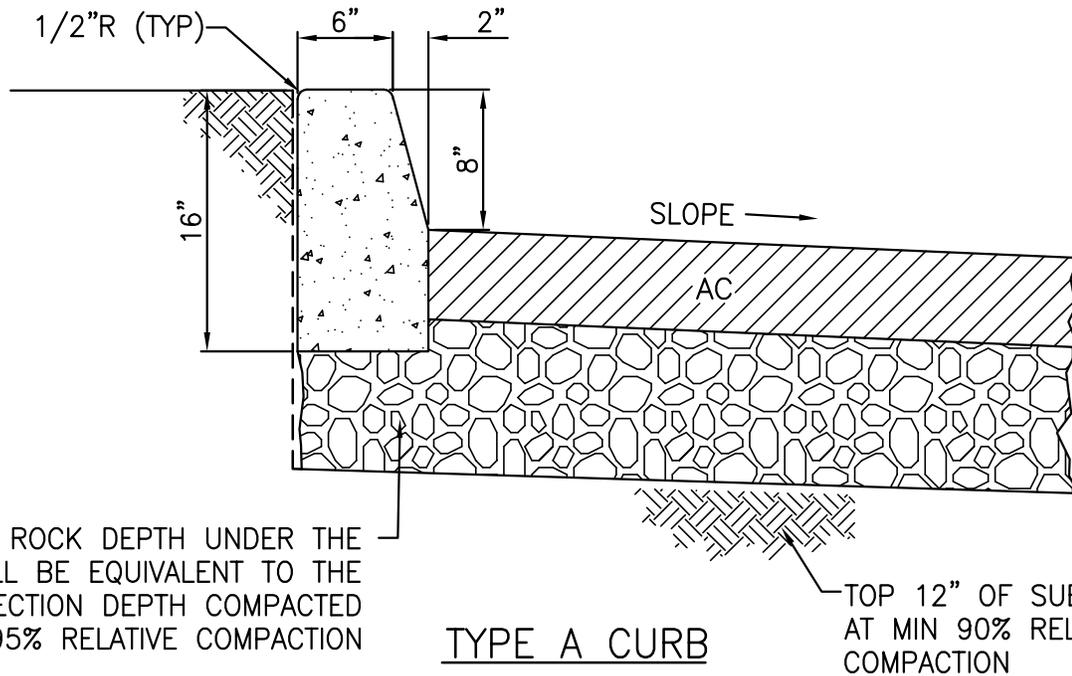
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-17

SCALE:
NONE

DATE:
09/13/11



NOTES:

1. SUBDRAINS MAY BE REQUIRED IN LANDSCAPED MEDIANS.
2. PORTLAND CEMENT CONCRETE SHALL CONFORM TO "MINOR CONCRETE" OF THE CALTRANS STANDARD SPECIFICATIONS EXCEPT THAT THE CEMENT CONTENT SHALL BE A MINIMUM OF 6 SACKS OF CEMENT PER CUBIC YARD OF CONCRETE.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
MEDIAN CURB**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

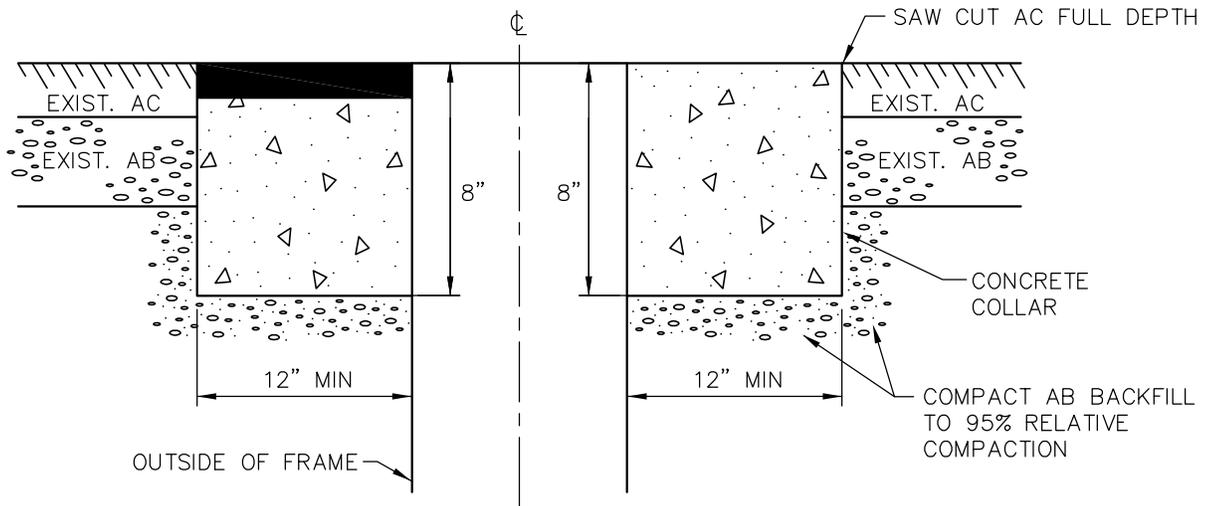
3-18

SCALE:
NONE

DATE:

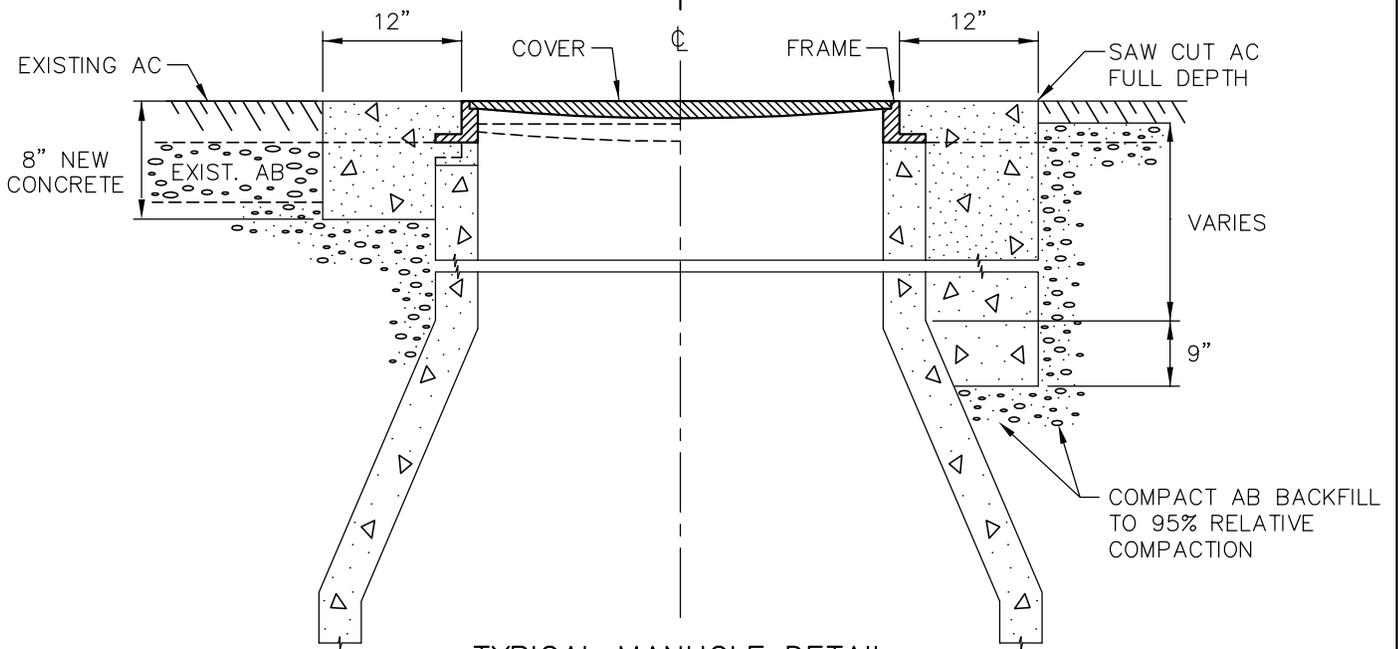
09/13/11

EXISTING IMPROVEMENT ← → NEW IMPROVEMENT



WATER VALVE OR STREET MONUMENT DETAIL

EXISTING IMPROVEMENT ← → NEW IMPROVEMENT



TYPICAL MANHOLE DETAIL

NOTES

1. WATER VALVE OR MANHOLE OR STREET MONUMENT SHALL BE RAISED TO GRADE AFTER PAVING.
2. LAMP BLACK CONCRETE COLLAR
3. AS AN ALTERNATIVE EXTENSION RINGS MAY BE USED FOR RAISING COVERS, SUBJECT TO APPROVAL OF THE ENGINEER.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD TO RAISE
A WATER VALVE, MANHOLE
OR STREET MONUMENTATION**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-20

SCALE:
NONE

DATE:
09/13/11

CURB RAMP NOTES:

1. ALL CURB RAMPS AT ANY LOCATION MUST COMPLY WITH CALIFORNIA BUILDING CODE TITLE 24. BACK OF SIDEWALK / CURB RAMPS, INCLUDING 4' LEVEL LANDINGS FOR TYPE 1 ,TYPE 3, AND TYPE 4, SHALL NOT EXTEND INTO PRIVATE PROPERTY. IF NEEDED, CONFORM BACK OF SIDEWALK AS DIRECTED BY THE ENGINEER.
2. ANCHOR NEW P.C.C. CONSTRUCTION TO EXISTING CURB, GUTTER AND SIDEWALK BY INSTALLING NO. 4 REINFORCING STEEL AS SHOWN IN STANDARD DWG. NO. 3-8. DEEP JOINTS AS DIRECTED BY ENGINEER.
3. IF ADJACENT AC GRADE DOES NOT MATCH NEW EDGE OF GUTTER LIP, OR IF AC IS FOUND TO BE DAMAGED, OR IN SUBSTANDARD CONDITION, REMOVE AND REPLACE A MIN. OF ONE FOOT WIDTH OF AC AND AS DIRECTED BY THE ENGINEER.
4. WIDTH OF CURB RAMPS: CURB RAMPS SHALL BE A MINIMUM OF 4 FEET IN WIDTH. TYPE 2 CURB RAMPS SHALL 4. HAVE A 5-FOOT LEVEL LANDING WIDTH.
5. SLOPE OF RAMPS: THE SLOPE OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 12 HORIZONTAL. THE SLOPE OF THE FANNED OR FLARED SIDES OF CURB RAMPS SHALL NOT EXCEED 1 VERTICAL TO 10 HORIZONTAL MEASURED AT FACE OF CURB.
6. CLEAR PASSAGE: A CLEAR PASSAGE SHALL BE PROVIDED TO PERMIT SAFE INGRESS / EGRESS TO OR FROM THE RAMP(S), AND SIDEWALK.
7. TRANSITIONS FROM RAMPS TO WALKS, GUTTERS, OR STREETS SHALL BE FREE OF ABRUPT CHANGES.
8. FINISH: THE SURFACE OF EACH CURB RAMP AND ITS FLARED SIDES SHALL BE SLIP-RESISTANT BROOM FINISH AND SHALL BE OF ROUGHER TEXTURE FROM THAT OF THE ADJACENT SIDEWALK.
9. BORDER: ALL CURB RAMPS SHALL HAVE A GROOVED BORDER 12" WIDE AT THE LEVEL SURFACE OF THE SIDEWALK ALONG THE TOP AND / OR EACH SIDE, AS SHOWN ON EACH DETAIL. THE GROOVES SHALL BE APPROXIMATELY 3/4" O.C. (SEE GROOVING DETAIL).
10. INSTALL 4" THICK MONOLITHIC RETAINING CURB AT BACK OF RAMPS & WINGS AS DIRECTED BY THE ENGINEER. RETAINING CURBS ARE CONSIDERED AS PART OF ALL RAMPS & NO ADDITIONAL PAYMENT WILL BE ALLOWED THEREFOR.
11. ACTUAL SHAPE / CONFIGURATION OF TYPE 2 & 4 RAMPS MAY VARY DUE TO DIFFERING FIELD CONDITIONS. NO ADDITIONAL PAYMENT WILL BE MADE FOR THESE VARIATIONS.
12. ADDITIONAL PCC WORK ADJACENT TO CURB RAMPS WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE APPROPRIATE BID ITEM.
13. CURB RAMPS SHALL HAVE A DETECTABLE WARNING SURFACE THAT EXTENDS THE FULL WIDTH AND 3'-0" DEPTH OF THE RAMP. DETECTABLE WARNING SURFACES SHALL CONFORM TO THE DETAILS ON THIS SHEET.
14. ALL CURB RAMPS TO BE REINFORCED WITH #3 REBAR @ 16" O.C. IN BOTH DIRECTIONS. TIE REBAR WITH DOWELS.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
CURB RAMP NOTES
REFERENCE - TITLE 24**

APPROVED BY:

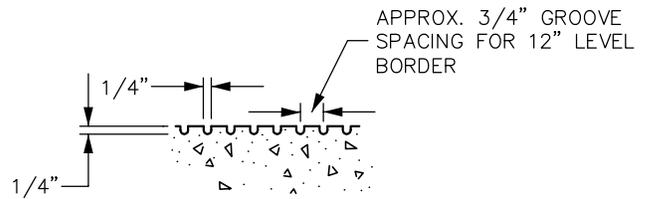
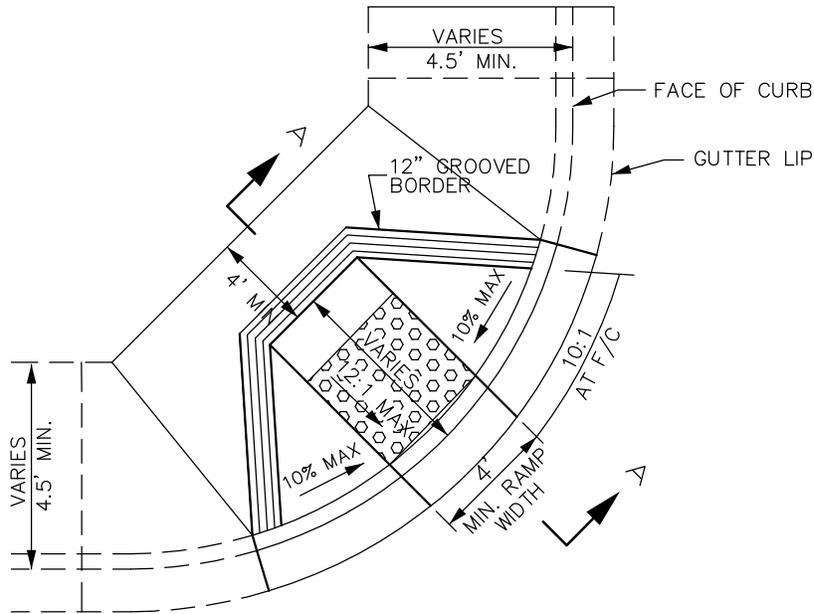
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

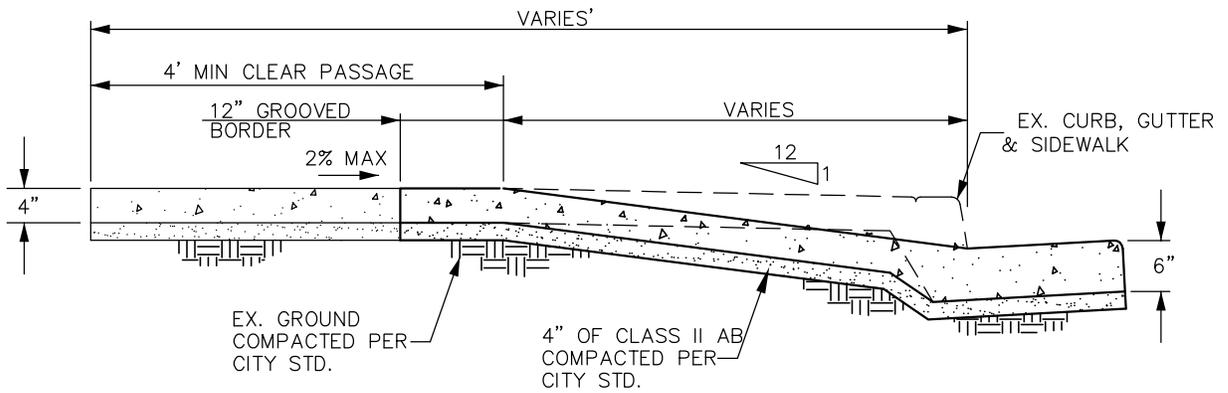
3-21

SCALE:
NONE

DATE:
09/13/11



GROOVING DETAIL



SECTION A-A

NOTE: TYPE 1 CURB RAMP SHALL CONFORM TO CALTRANS TYPE A CURB RAMP, A88A



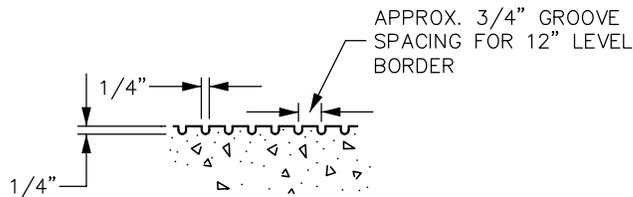
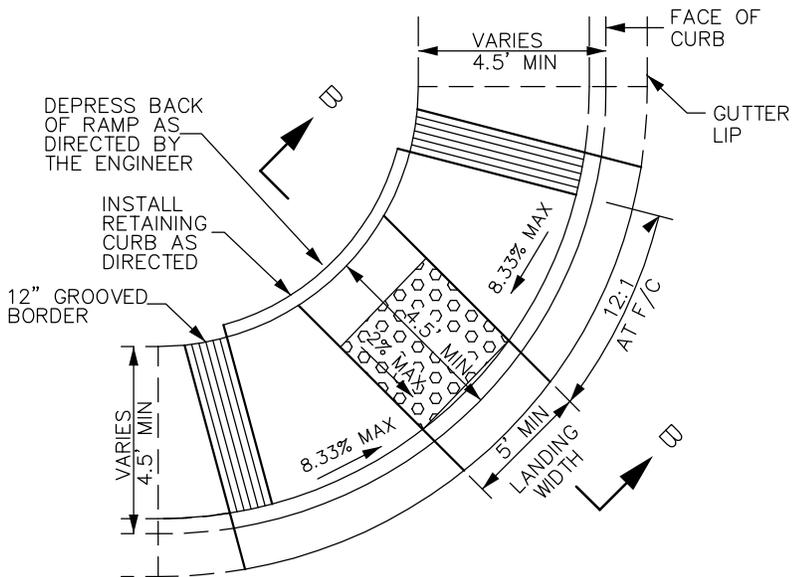
CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPE 1 CURB RAMP DETAIL**

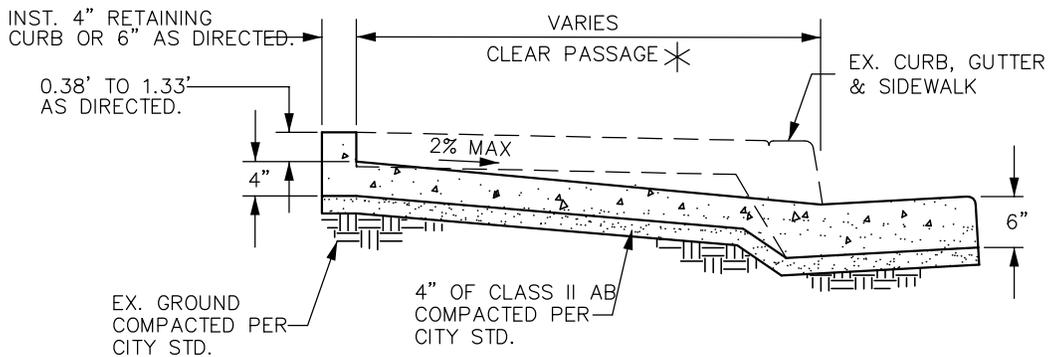
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-22
SCALE:
NONE
DATE:
09/13/11



GROOVING DETAIL



SECTION B-B

NOTE: TYPE 2 CURB RAMP SHALL CONFORM TO CALTRANS TYPE C CURB RAMP, A88A



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPE 2 CURB RAMP DETAIL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

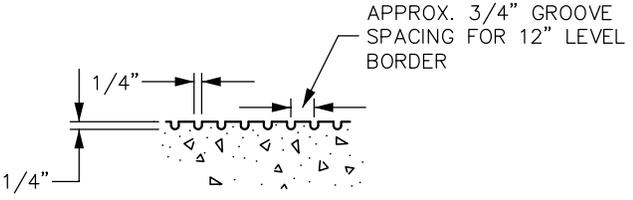
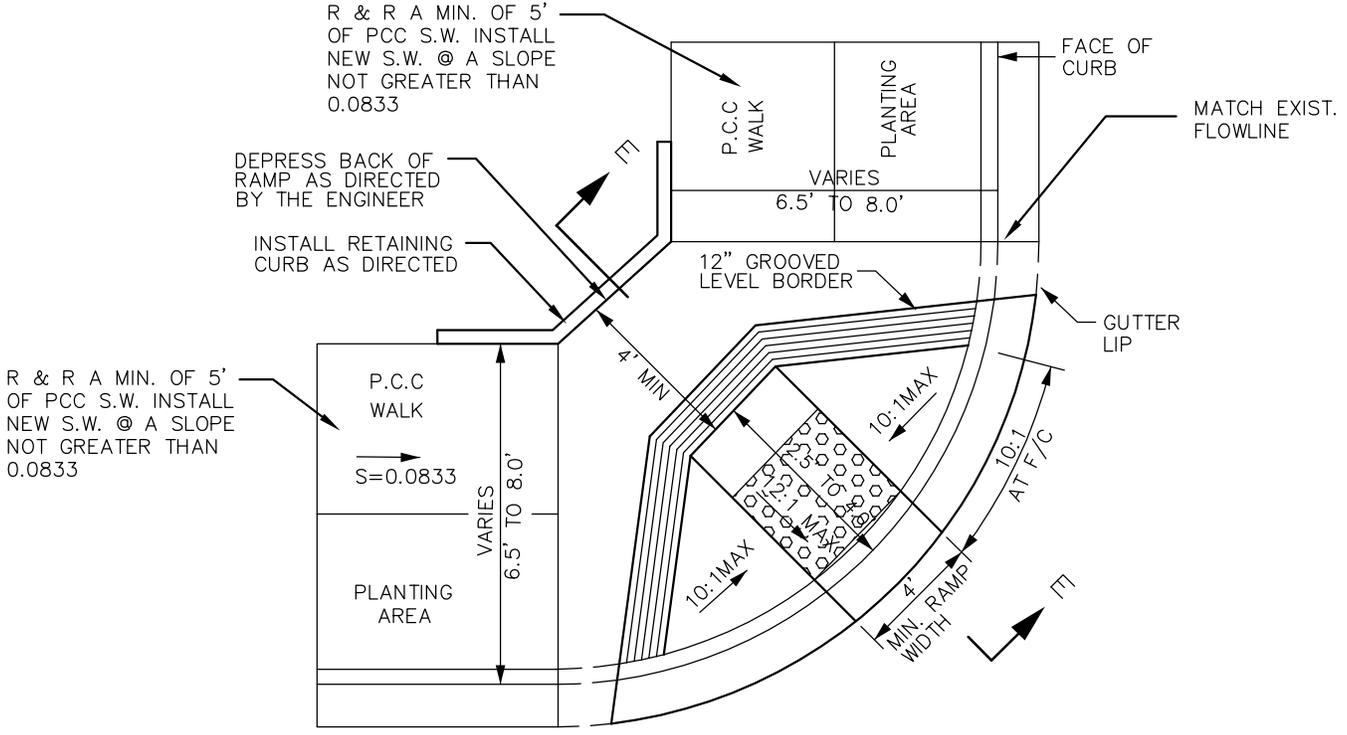
DRAWING NO:

3-23

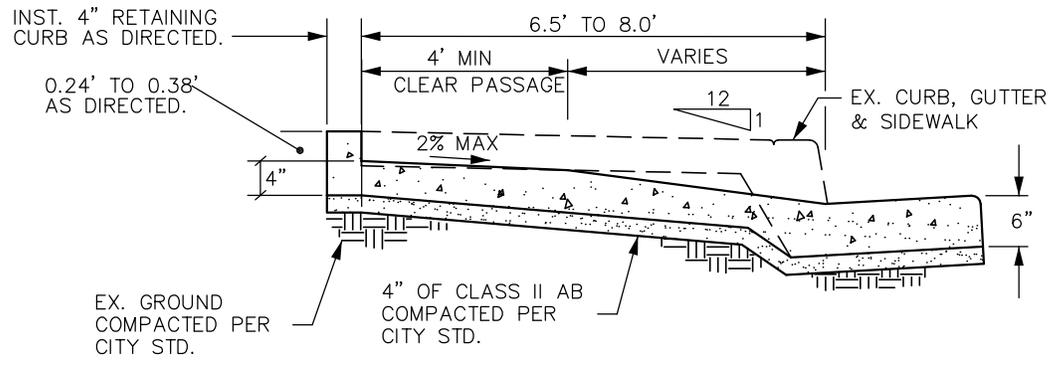
SCALE:
NONE

DATE:

09/13/11



GROOVING DETAIL



SECTION E-E



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPE 4 CURB RAMP DETAIL**

APPROVED BY:

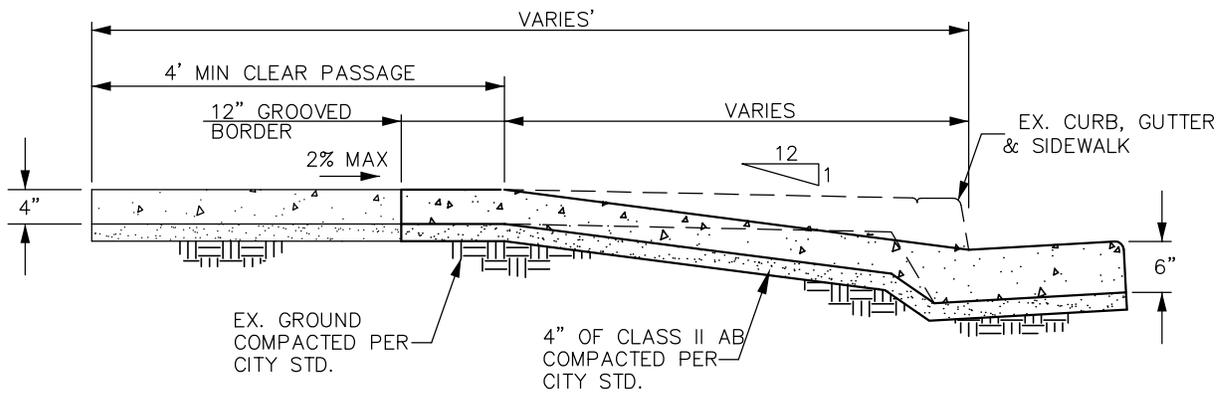
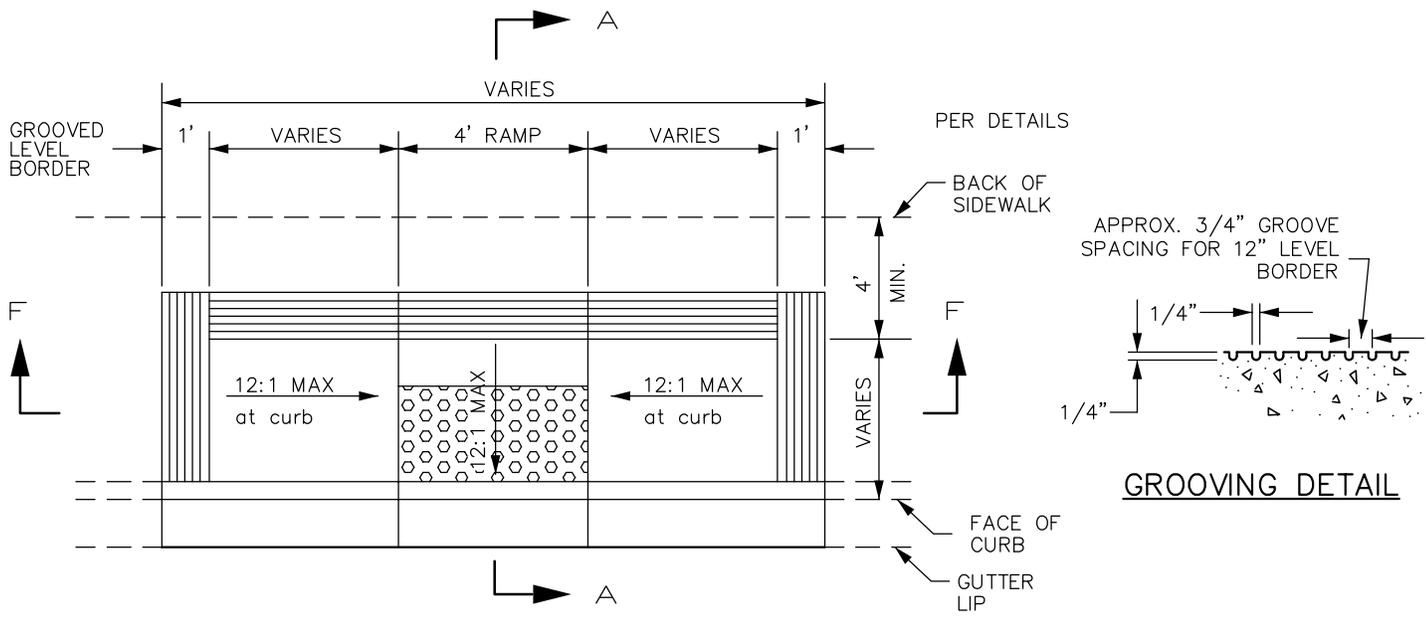
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

3-24

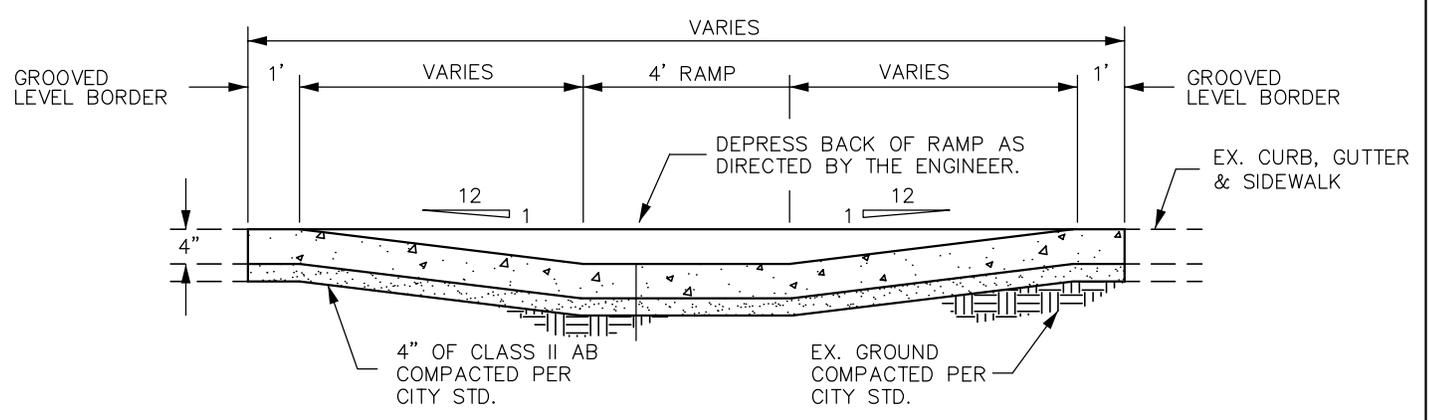
SCALE:
NONE

DATE:
09/13/11



SECTION A-A

NOTE: TYPE 1 CURB RAMP SHALL CONFORM TO CALTRANS TYPE A CURB RAMP, A88A



SECTION F-F



CITY OF VALLEJO STANDARD DETAIL

STANDARD TYPE 5 CURB RAMP DETAIL

APPROVED BY:

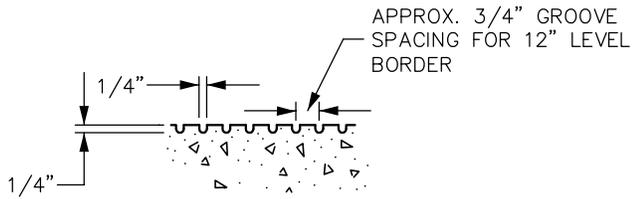
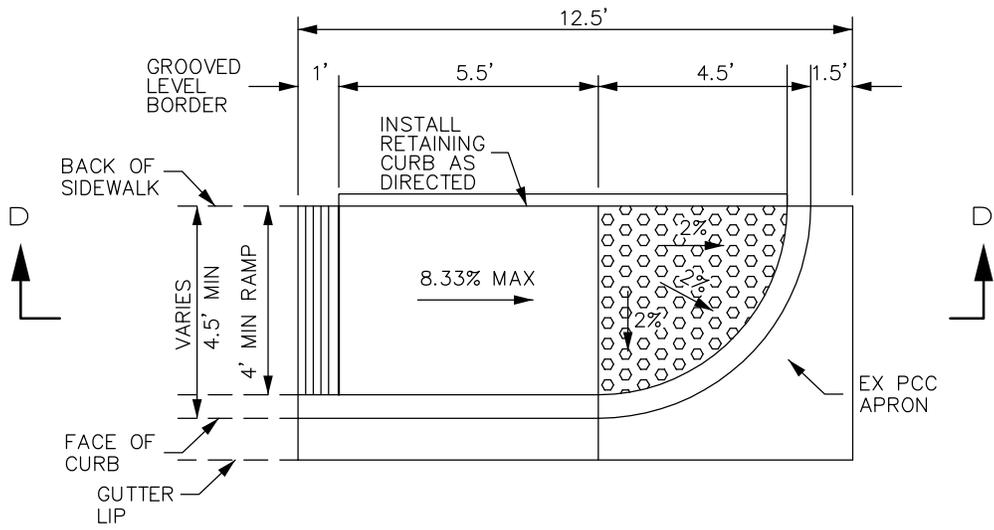


DIRECTOR OF PUBLIC WORKS

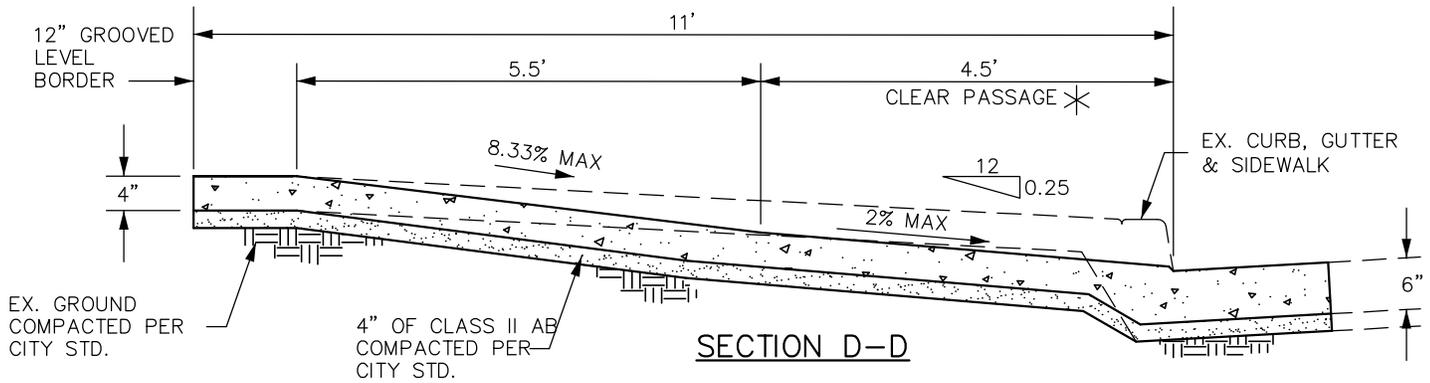
DRAWING NO:
3-25

SCALE:
NONE

DATE:
09/13/11



GROOVING DETAIL



SECTION D-D



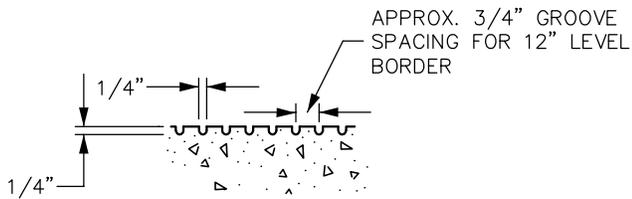
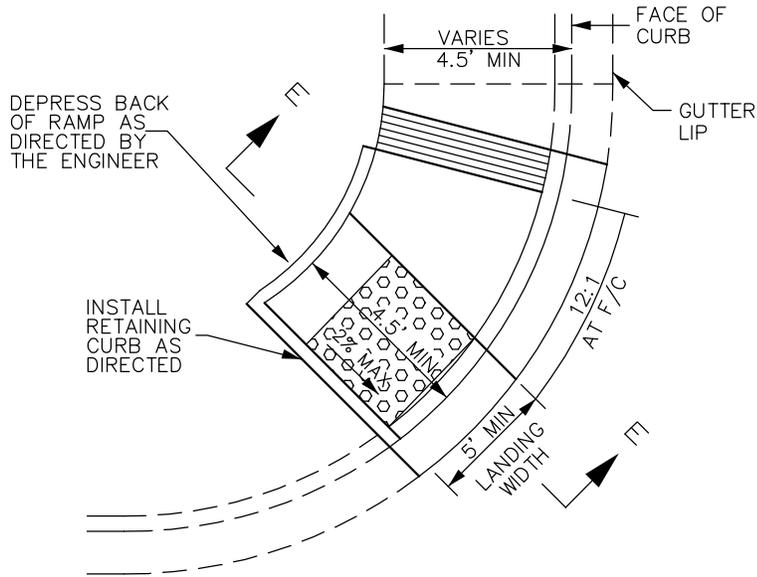
CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPE 11 CURB RAMP DETAIL**

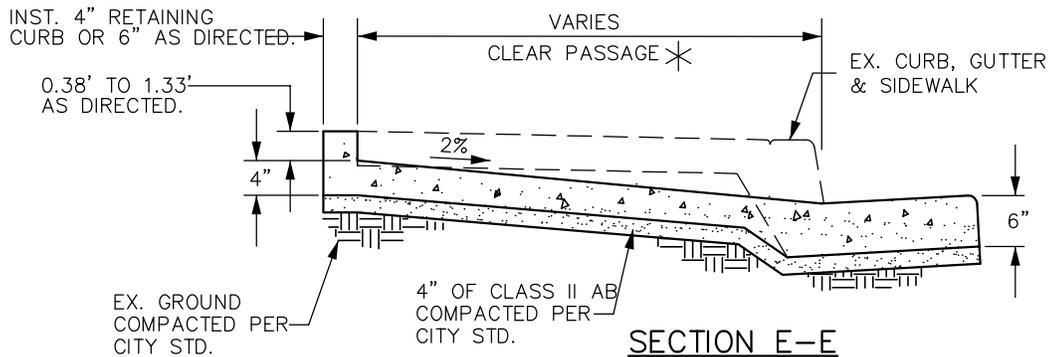
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-26
SCALE:
NONE
DATE:
09/13/11



GROOVING DETAIL



SECTION E-E



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
MODIFIED
TYPE 2 CURB RAMP DETAIL**

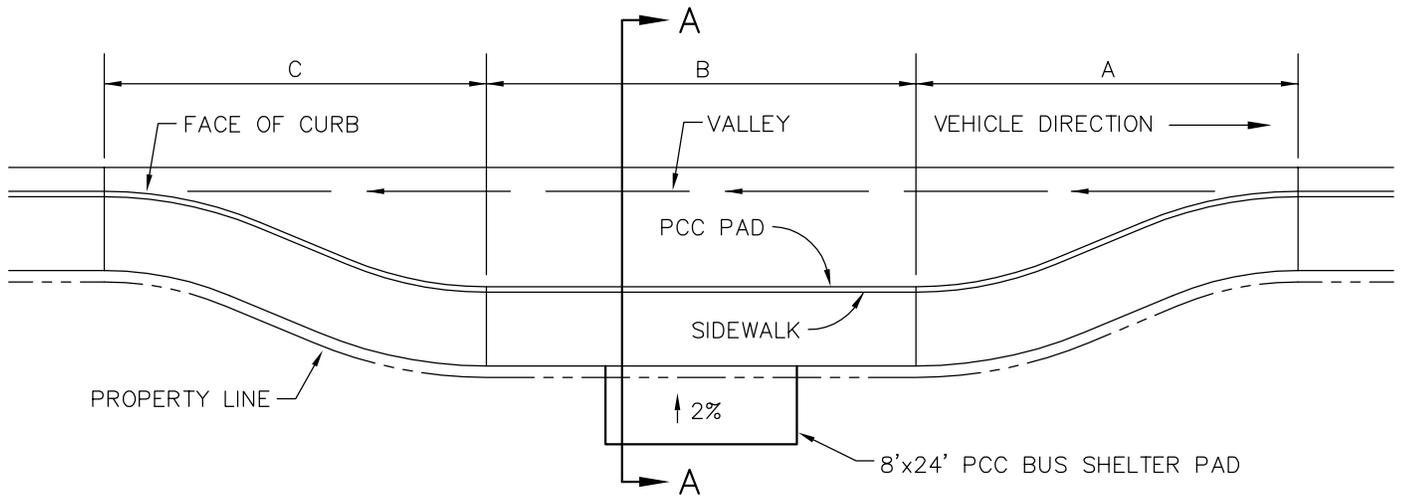
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

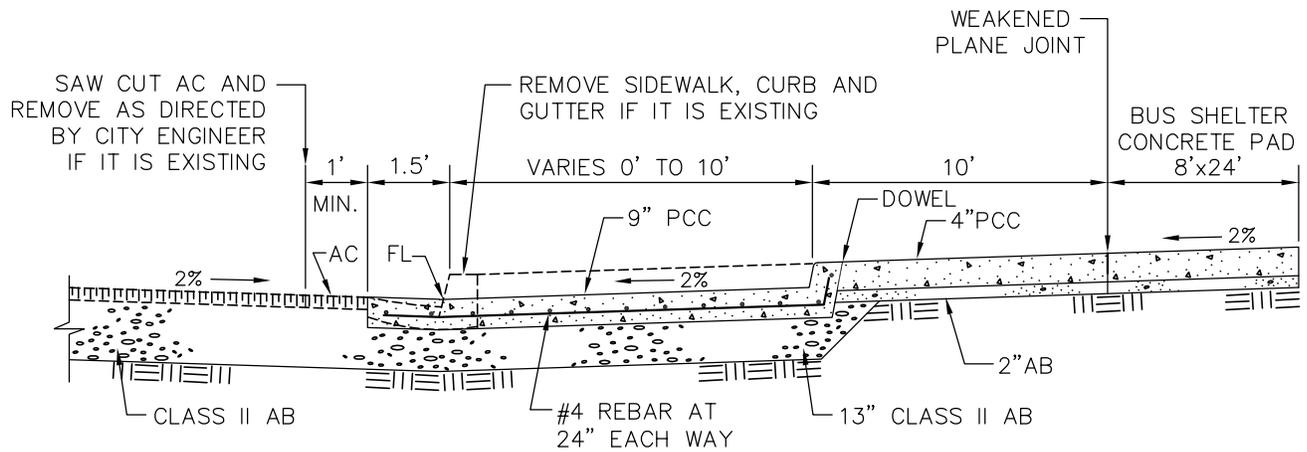
DRAWING NO:
3-27

SCALE:
NONE

DATE:
09/13/11



PLAN



SECTION A-A

MINIMUM DISTANCES

POSTED SPEED OF STREET (MPH)	1 BUS			2 BUS		
	<20	20-30	30-40	<20	20-30	30-40
A (FT)	50	80	125	50	80	125
B (FT)	50	50	50	90	90	90
C (FT)		100	225	50	100	225

- NOTES:
1. THE SIDEWALK IS TO BE CONSTRUCTED PER THE CITY OF VALLEJO STANDARD DRAWING #3-10
 2. THE PCC PAD FOR THE BUS BAY AND SHELTER SHALL:
 - a) BE BROOM FINISH UNLESS OTHERWISE DIRECTED BY THE CITY
 - b) USE PIGMENTED SEALING COMPOUND FOR CURING
 - c) HAVE A DEEP JOINT EVERY 12 FEET PER CITY OF VALLEJO STANDARD DRAWING #3-9



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
BUS PARKING BAY**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

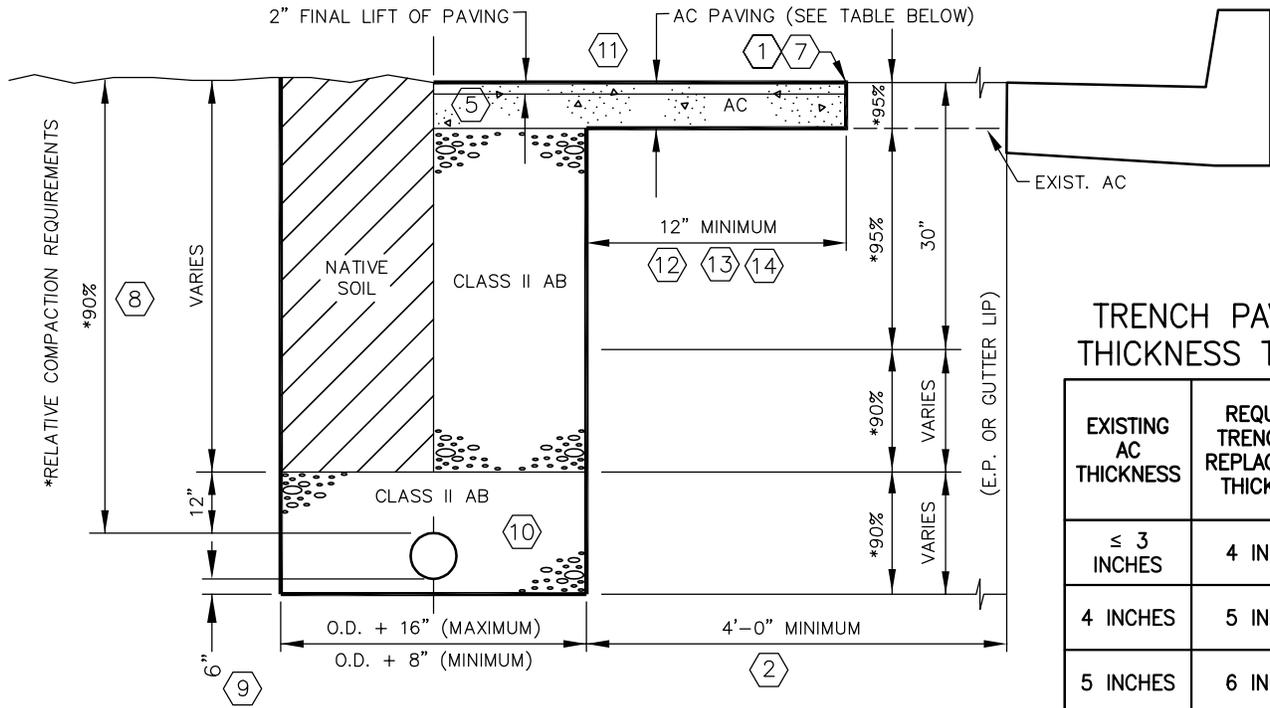
DRAWING NO:
3-28

SCALE:
NONE

DATE:
09/13/11

UNPAVED AREAS

PAVED AREAS



TRENCH PAVING THICKNESS TABLE

EXISTING AC THICKNESS	REQUIRED TRENCH AC REPLACEMENT THICKNESS
≤ 3 INCHES	4 INCHES
4 INCHES	5 INCHES
5 INCHES	6 INCHES
≥ 6 INCHES	7 INCHES

NOTES

- ① ASPHALT CONCRETE (AC) MUST BE SAWCUT FULL DEPTH.
- ② IF DISTANCE BETWEEN EDGE OF TRENCH TO GUTTER LIP (OR EDGE OF PAVEMENT) IS 4' OR LESS, THEN REMOVE ALL AC UP TO GUTTER LIP (OR E.P.) AND REPAVE
- ③ SHORING SHALL BE REQUIRED FOR TRENCH DEPTH OF 5'-0" OR GREATER AND WHERE UNSTABLE SOIL CONDITIONS ARE ENCOUNTERED.
- ④ IN BACKFILLING UTILITY WIRES, A MAXIMUM OF 12" OF SAND ABOVE THEM WILL BE PERMITTED.
- ⑤ AC SHALL BE TYPE B; 1/2" MAX.; AND MEDIUM GRADING. TO INSURE ADEQUATE BONDING; A TACK COAT (SS-1) SHALL BE APPLIED OVER EXISTING AC PAVEMENT AND A PRIME COAT (MC-250) SHALL BE APPLIED OVER COMPACTED AB (SS-1 MAYBE SUBSTITUTED FOR EXISTING STREETS). USE OF MC-250 SHALL COMPLY WITH E.P.A. (ENVIRONMENTAL PROTECTION AGENCY) REGULATIONS.
- ⑥ TRAFFIC CONTROL AND WARNING SIGNS SHALL BE PER THE MANUAL OF TRAFFIC CONTROLS; PUBLISHED BY THE DEPARTMENT OF TRANSPORTATION, STATE OF CALIFORNIA.
- ⑦ SPRAY AC JOINT WITH SS-1.
- ⑧ IN PREVIOUSLY UNDEVELOPED AREAS TO BE PAVED; THE RELATIVE COMPACTION REQUIREMENTS IS AS SHOWN UNDER PAVED AREAS.
- ⑨ IF SURROUNDING MATERIALS ARE OF A HIGHLY IMPERMEABLE COMPOSITION, THEN TYPE I BEDDING IS REQUIRED.
- ⑩ USE SAND BACKFILL FOR DUCTILE IRON PIPE.
- ⑪ MATCH EXISTING AC THICKNESS IF GREATER THAN 4".
- ⑫ STREET PAVEMENT CONSTRUCTED WITHIN THE MORATORIUM PERIOD (5 YEARS) SHALL BE GROUND AND PAVED A MINIMUM DEPTH OF 2 IN. THICKNESS AND A MINIMUM WIDTH OF 20 FEET FROM EACH SIDE OF TRENCH CENTER LINE FROM GUTTER LIP TO GUTTER LIP OF THE EXISTING ROADWAY UNLESS APPROVED BY THE CITY ENGINEER.
- ⑬ GRINDING AND PAVING SHALL BE PERFORMED AFTER THE TYPICAL BACKFILL & PAVING OF TRENCH HAS BEEN COMPLETED AND INSPECTED.
- ⑭ THE EDGE OF THE GRIND AND PAVE AREA SHALL BE PERPENDICULAR TO ALL CONTIGUOUS LANES OF A A TRAVELED WAY. THE DISTANCE BETWEEN EACH PERPENDICULAR EDGE SHALL NOT BE GREATER THAN 10 FEET NOR LESS THAN 5 FEET.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TYPICAL TRENCH BACKFILL**

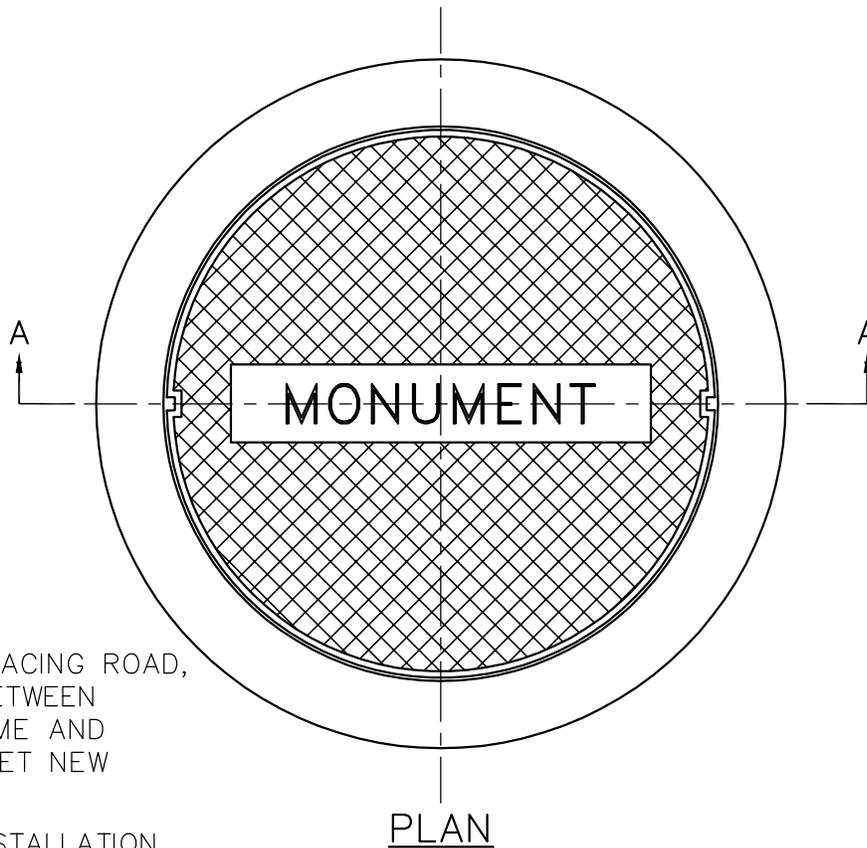
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-29

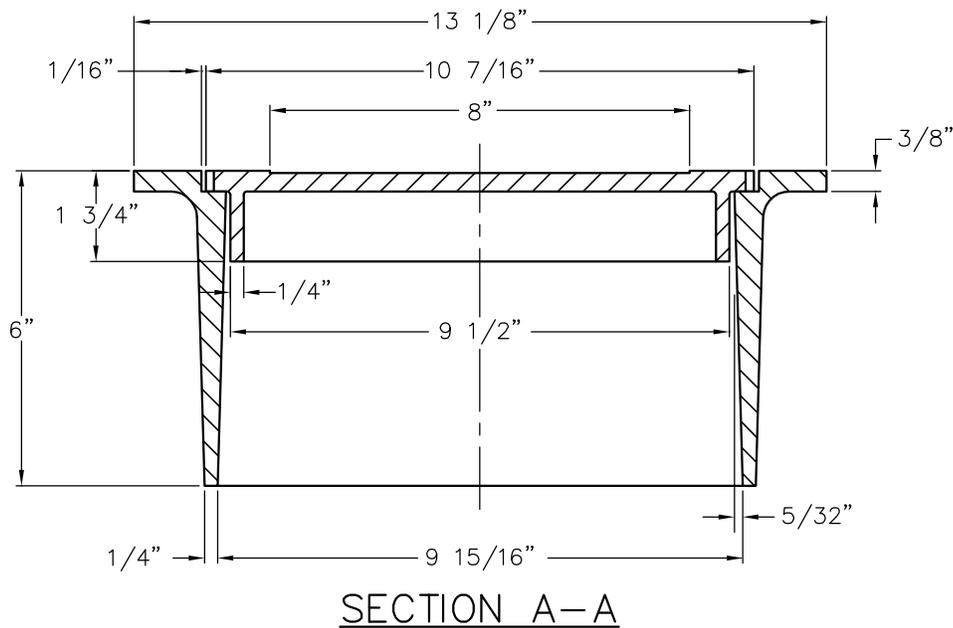
SCALE:
NONE

DATE:
09/13/11



NOTES

1. WHEN RESURFACING ROAD, ADD RISER BETWEEN EXISTING FRAME AND COVER TO MEET NEW ROAD GRADE.
2. BASE AND INSTALLATION TO BE AS SHOWN ON CITY STD. DWG. 3-23.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
MONUMENT CASTING**

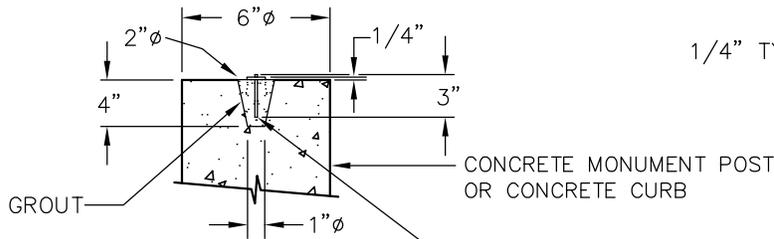
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
3-31

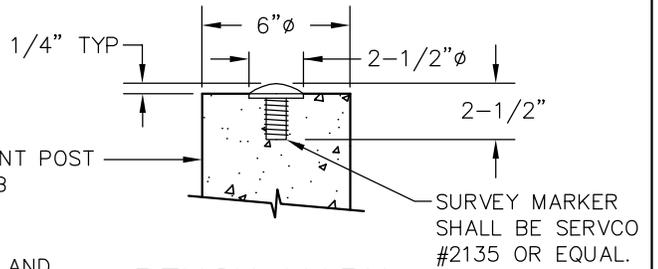
SCALE:
NONE

DATE:
09/13/11



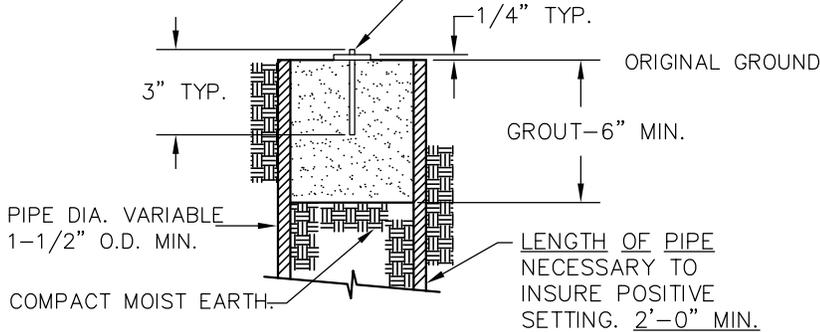
SURVEY MONUMENT

GALVANIZED NAIL AND R.E./L.S. TAG OR DISK MUST BE FASTENED TOGETHER AND INSTALLED AS A UNIT

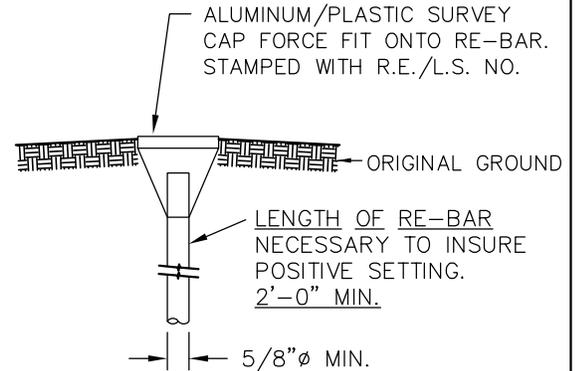


BENCH MARK ELEVATION

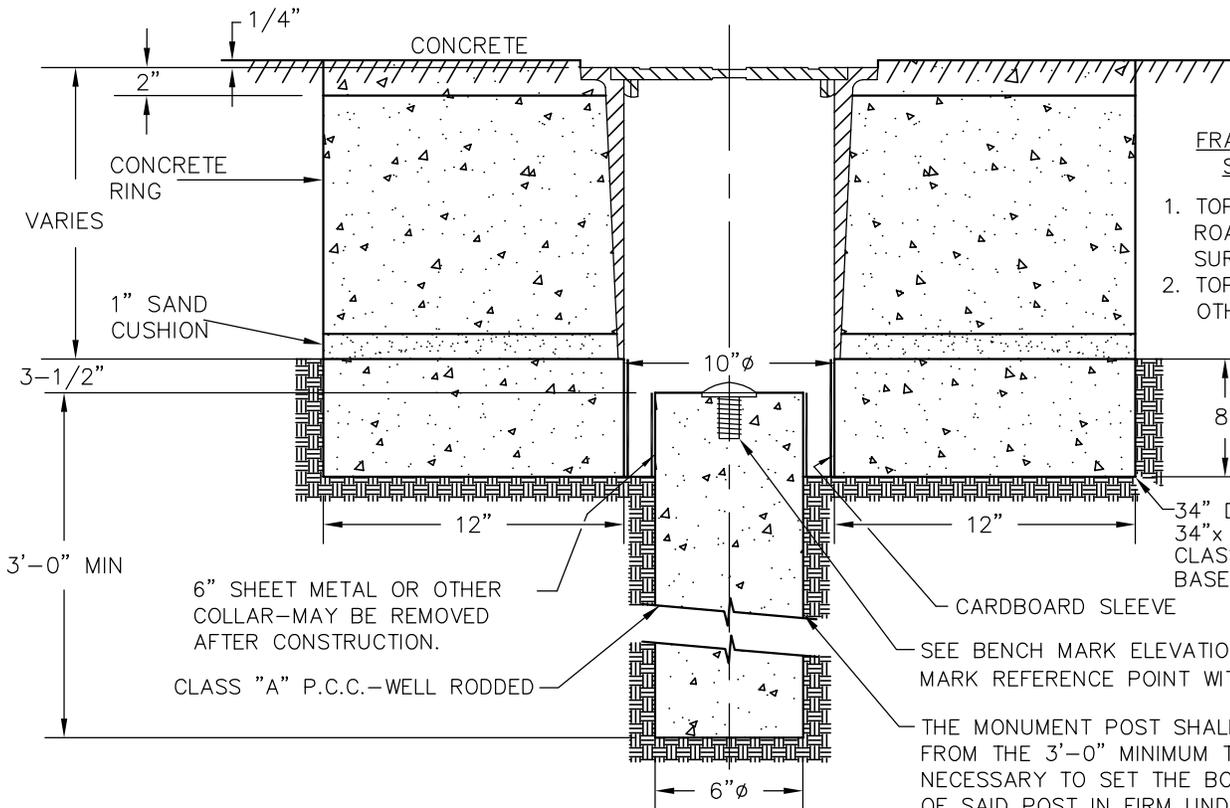
SURVEY MARKER SHALL BE SERVCO #2135 OR EQUAL.



IRON PIPE MONUMENT



RE-BAR MONUMENT



NOTE

FRAME AND COVER SHALL BE SET

1. TOP 1/4" BELOW ROADWAY PAVEMENT SURFACE.
2. TOP FLUSH WITH ALL OTHER SURFACES.



CITY OF VALLEJO STANDARD DETAIL
STANDARD INSTALLATION DETAILS
CITY SURVEY MONUMENT
AND BENCHMARK ELEVATION

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

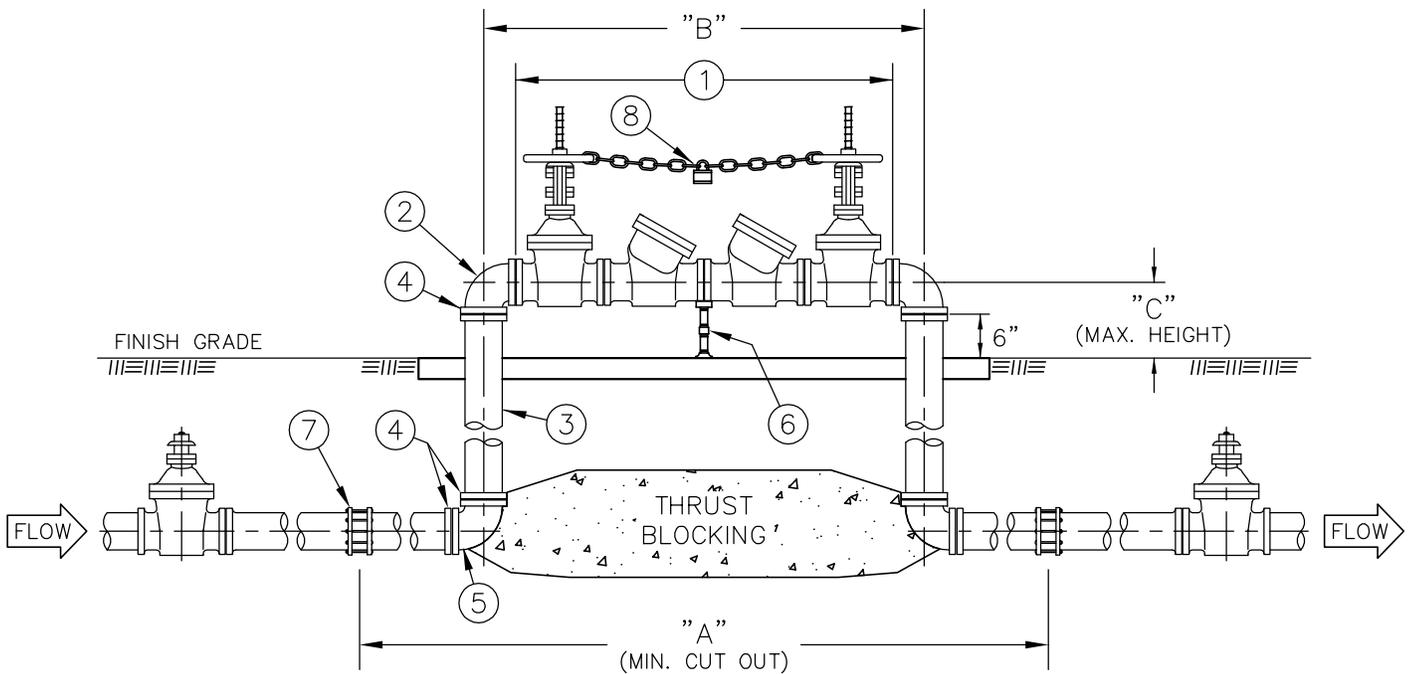
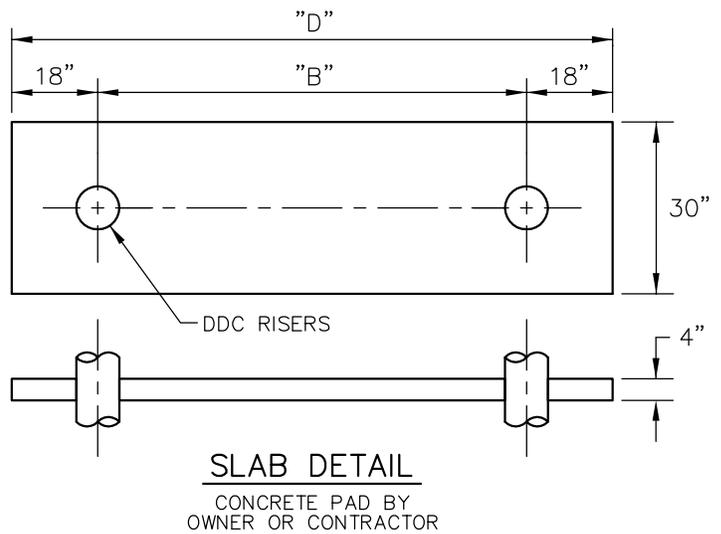
3-33

SCALE:
NONE

DATE:
09/13/11

DIMENSIONS				
NOM. DIA.	A MIN. CUT OUT	B	C MAX. HEIGHT	D
4"	7'-6"	5'-3 7/16"	12 1/2"	8'-3 7/16"
6"	8'-7"	6'-3 11/16"	14"	9'-3 11/16"
8"	9'-10"	7'-3 3/16"	15"	10'-3 3/16"
10"	11'-8"	8'-10 3/16"	17"	11'-10 3/16"

MATERIALS LIST		
No.	QTY.	DESCRIPTION
①	1	DOUBLE-DETECTOR CHECK VALVE ASSY.
②	2	90° ELBOW, FLANGE x M.J.
③	2	± 5 FT. EACH, DUCTILE IRON PIPE
④	6	M.J. RESTRAINING GLANDS
⑤	2	90° ELBOW, M.J. x M.J.
⑥	1	PIPE SUPPORT
⑦	2	STD. FLEX. COUPLINGS OR M.J. SLEEVES
⑧	1	CHAIN AND LOCK, AS REQUIRED



NOTES

- DIMENSIONS FROM "FEBCO MODEL 806". ANY CHANGE IN DIMENSIONS ARE BECAUSE OF MANUFACTURER CHANGE.
- BACKFLOW DEVICE SHALL BE PROVIDED AND INSTALLED BY THE CITY.
- UNLESS OTHERWISE DIRECTED, THE BACKFLOW DEVICE SHALL BE PERPENDICULAR TO THE STREET, AT THE BACK OF THE SIDEWALK
- HYDROSTATIC TESTING IS THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE COMPLETED AND APPROVED BY THE CITY INSPECTOR AND THE FIRE DEPARTMENT, BEFORE THE BACKFLOW DEVICE IS INSTALLED.
- THRUST RESTRAINT DURING HYDROSTATIC TESTING, IS THE RESPONSIBILITY OF THE CONTRACTOR. ANY TEMPORARY RESTRAINT, SHALL BE REMOVED AS DIRECTED.
- WHEN THE CITY HAS INSTALLED THE DEVICE, THE CITY WILL CHAIN THE SHUT-OFF VALVES, AS FOLLOWS:
STREET VALVE OPEN, AND THE PROPERTY VALVE CLOSED. UNLESS OTHERWISE DIRECTED BY THE CITY FIRE DEPT.
- UNLESS OTHERWISE DIRECTED, ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD FIRE SPRINKLER SERVICE
BACKFLOW PREVENTER INSTALLATION**

FOR DOUBLE-DETECTOR CHECK VALVE ASSEMBLY WITH VALVES IN-LINE

APPROVED BY:

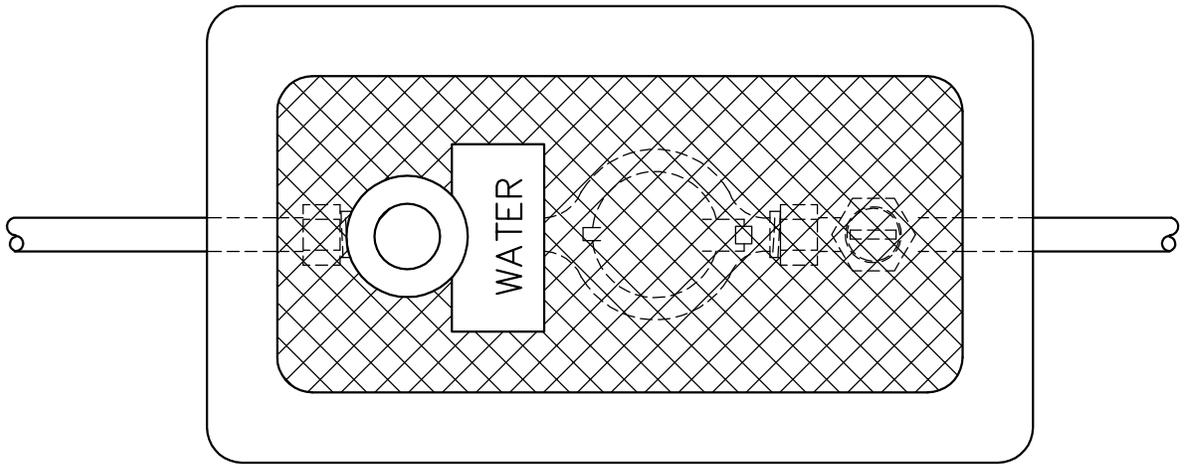
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

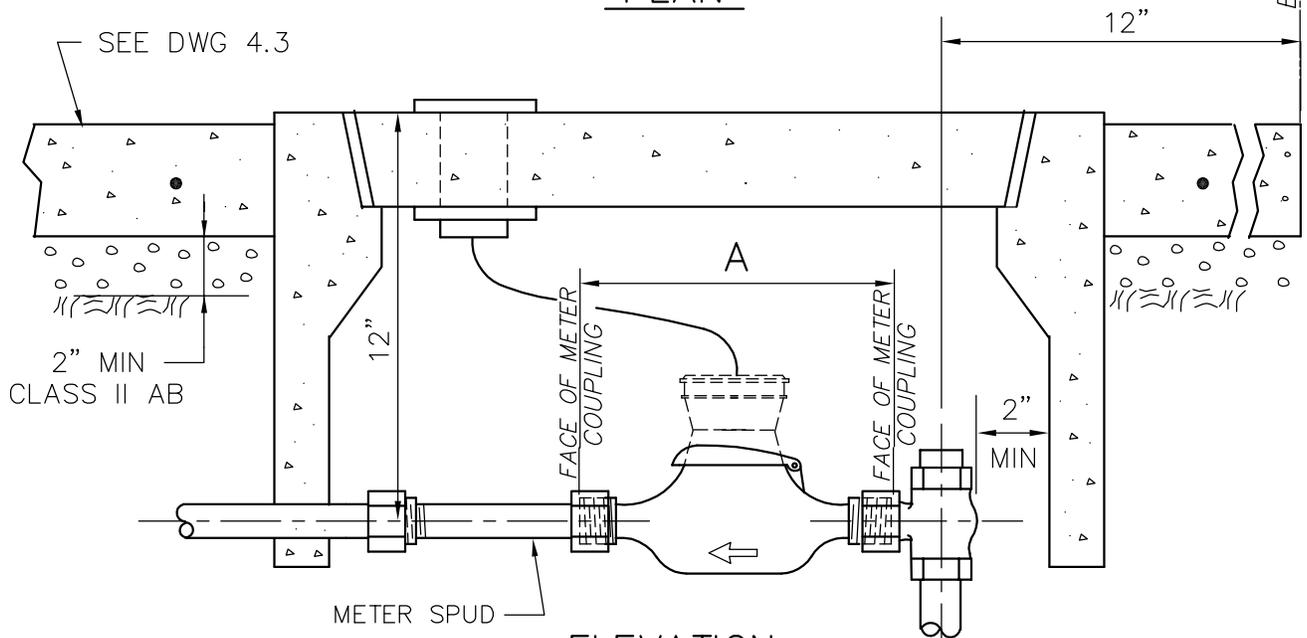
4-01

SCALE:
NONE

DATE:
9/13/11



PLAN



ELEVATION

METER SIZE	A	METER BOX (SEE SPEC. SEC. 4.2.12)
3/4"x5/8"	7-1/2"	"CHRISTY" B-9
3/4"x3/4"	7-1/2"	"CHRISTY" B-9
1"	10-3/4"	"CHRISTY" B-16

NOTES:

CONTRACTOR OF SUBDIVIDER SHALL FURNISH AND INSTALL ALL MATERIALS EXCEPT WATER METER AND METER SPUD. METER BOX WILL BE FURNISHED BY THE CITY BUT WILL BE INSTALLED BY THE CONTRACTOR OR SUBDIVIDER.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
3/4" & 1" WATER METER
INSTALLATION**

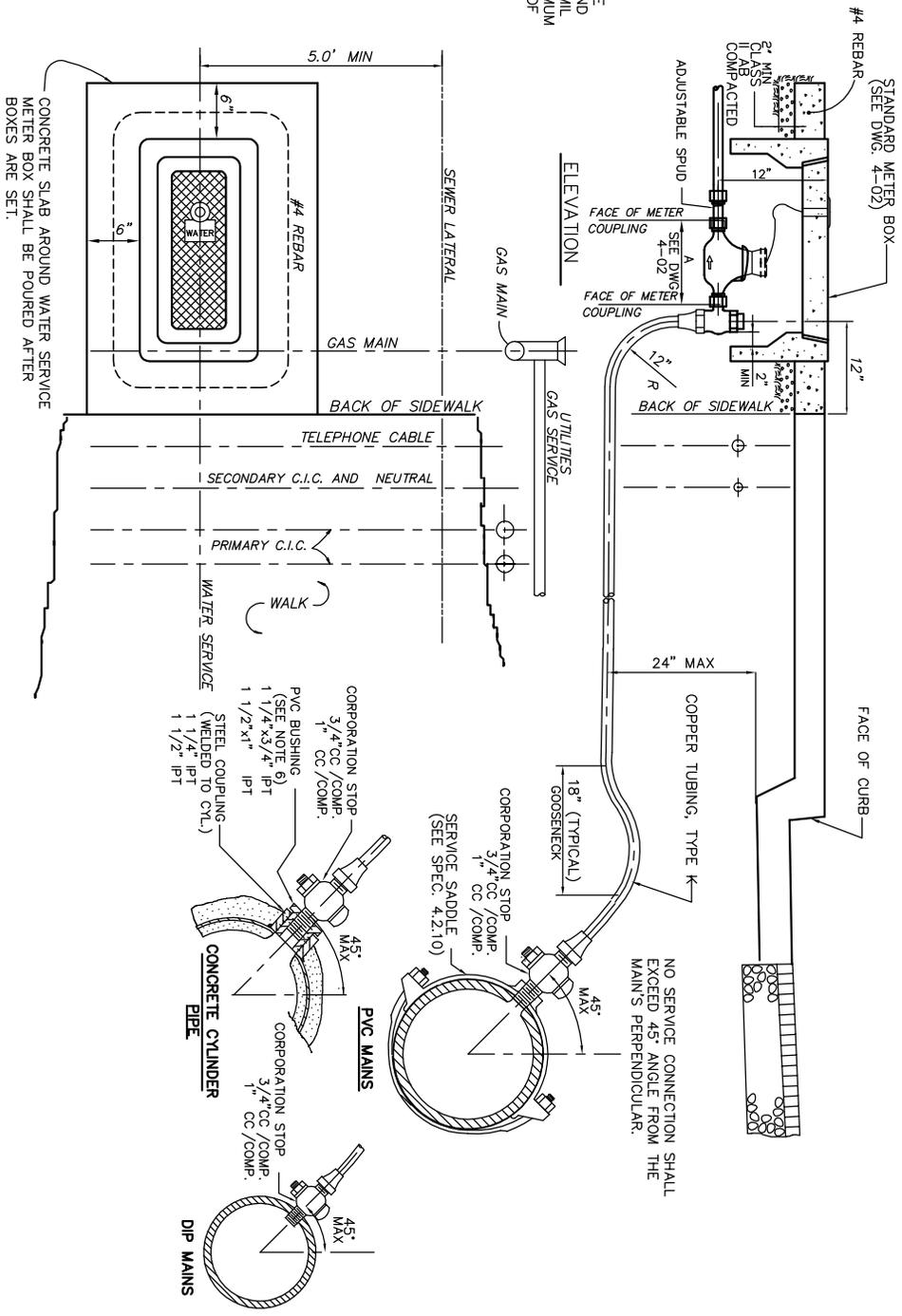
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-02
SCALE:
NONE
DATE:
9/13/11

1. SERVICE SADDLE ARE NOT REQUIRED FOR 3/4" AND 1" TAPS INTO DUCTILE IRON PIPE MAINS, EXCEPT WHEN D.I.P. MAIN IS CATHODICALLY PROTECTED. FOR CATHODICALLY PROTECTED D.I.P. REMOVE A 6" WIDE BAND OF POLYWRAP FROM AROUND THE MAIN. TAPE WRAP BARE PIPE WITH 10 MIL VINYL TAPE. HALF LAPPED TO PROVIDE MINIMUM 20 MILS OF PROTECTION. SEAL OPEN ENDS OF POLYWRAP WITH 2 WRAPS OF TAPE AT TAP LOCATION, CAREFULLY CUT AWAY VINYL TAPE TO ALLOW DIRECT SEALING OF SERVICE SADDLE GASKET ON BARE PIPE. INSTALL SERVICE SADDLE WITHOUT CUTTING OR DAMAGING VINYL TAPE. FOR CATHODICALLY PROTECTED D.I.P., PROVIDE DI-ELECTRIC C.C. THREAD NYLON BUSHING, A SERVICE SADDLE AND A CORPORATION STOP CONNECTION.
2. ON CONCRETE CYLINDER PIPE (C.C.P.) COAT ALL EXPOSED FERROUS METAL WITH A MINIMUM OF 1/2" OR MORTAR.
3. TAPS SHALL BE SPACED A MINIMUM OF 24" ON CENTER FROM ANOTHER TAP, BELL, SPIGOT OR ANOTHER FITTING.
4. MULTIPLE TAPS INTO PVC MAINS SHALL BE LOCATED IN DIFFERENT POSITIONS TO PREVENT CRACK PROPAGATION.
5. COPPER SERVICE PIPE SHALL BE CONTINUOUS FROM CORPORATION STOP TO CURB STOP. SPIGOTS ARE NOT PERMITTED EXCEPT WHEN SERVICE RUN EXCEEDS 80 FT.
6. INSULATING BUSHING SHOWN ON CONCRETE CYLINDER PIPE IS FOR CATHODICALLY PROTECTED WATERMANS.
7. SEE SPECIFICATIONS SECTION 4.2.8 - SERVICE PIPE 4.2.9 - SERVICE FITTINGS 4.2.10 - SERVICE SADDLES

NOTES:



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
3/4" & 1" WATER
SERVICE INSTALLATION**

APPROVED BY:

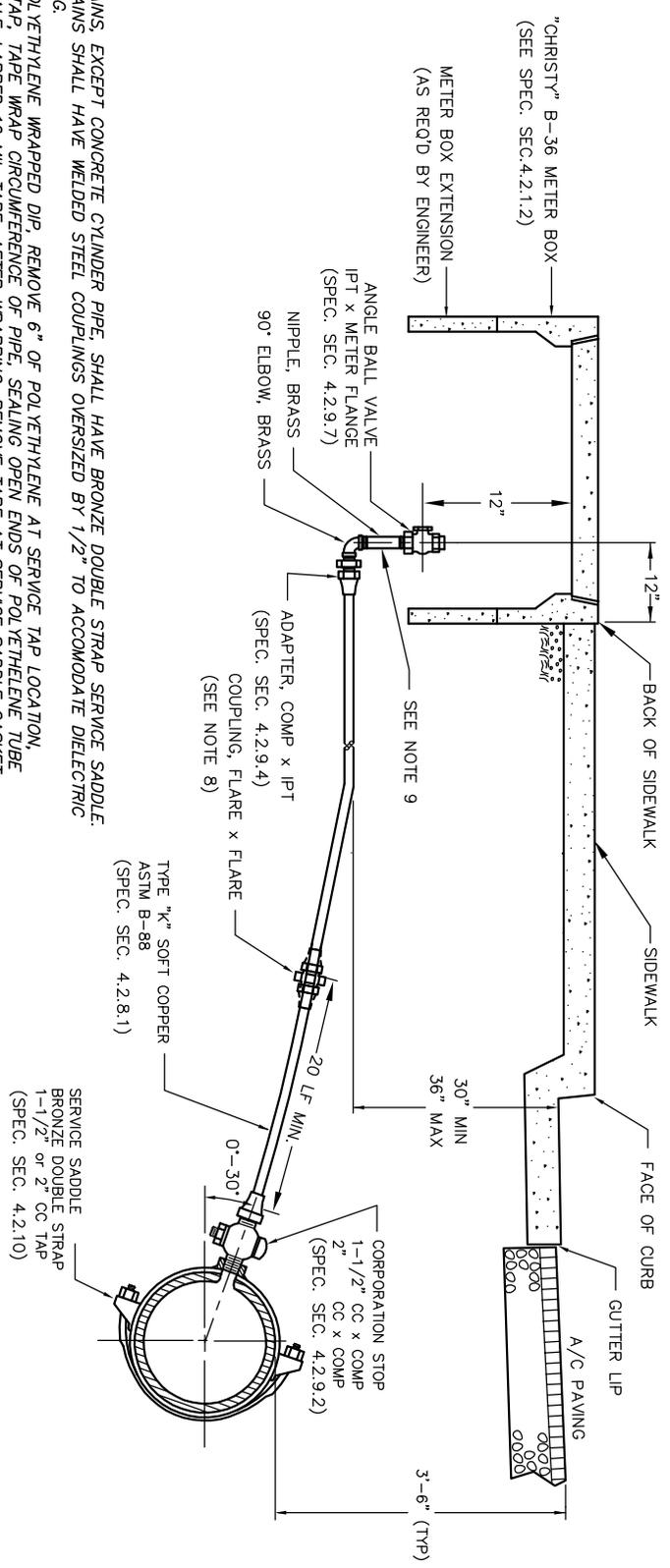
[Signature]

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-03

SCALE:
NONE

DATE:
9/13/11



- NOTES:**
1. ALL MAINS, EXCEPT CONCRETE CYLINDER PIPE, SHALL HAVE BRONZE DOUBLE STRAP SERVICE SADDLE. CCP MAINS SHALL HAVE WELDED STEEL COUPLINGS OVERTSIZED BY 1/2" TO ACCOMMODATE DIELECTRIC BUSHING.
 2. FOR POLYETHYLENE WRAPPED DIP, REMOVE 6" OF POLYETHYLENE AT SERVICE TAP LOCATION, MAKE TAP, TAPE WRAP CIRCUMFERENCE OF PIPE, SEALING OPEN ENDS OF POLYETHYLENE TUBE WITH HALF-LAPPED 10 MIL TAPE. AFTER WRAPPING, REMOVE TAPE AT SERVICE SADDLE GASKET LOCATION, INSTALL SERVICE SADDLE. WRAP SERVICE SADDLE WITH 16 MILS OF POLYETHYLENE. USE 10 MIL VINYL TAPE TO SEAL ALL OPENINGS.
 3. ON CONCRETE CYLINDER PIPES (CCP), REPLACE CEMENT MORTAR COATING ON MAIN AND COAT ENTIRE COUPLING WITH 2 INCHES OF MORTAR.
 4. THE LOCATION OF THE TAP SHALL BE A MINIMUM OF 24" FROM ANOTHER TAP, BELL, SPIGOT OR OTHER FITTINGS.
 5. DO NOT COAT PVC BUSHING WITH MASTIC OR OTHER SOLVENT BASED COATING.
 6. WATER HOOK-UP FEES INCLUDE METER AND METER BOX. METER BOX SHALL BE INSTALLED BY APPLICANT. METER INSTALLATION BY CITY FORCES.
 7. MUELLER COMPRESSION STYLE FITTINGS MAY BE USED IN LIEU OF FLARE CONNECTIONS SHOWN.
 8. COUPLINGS ARE NOT PERMITTED ON SERVICE RUNS THAT ARE LESS THAN 20 LF (SEE SPEC. SEC. 4.2.9.5)
 9. TYPE "K" COPPER MAY BE USED IN LIEU OF BRASS NIPPLE.



CITY OF VALLEJO STANDARD DETAIL

STANDARD
1-1/2" & 2" WATER
SERVICE INSTALLATION

APPROVED BY:

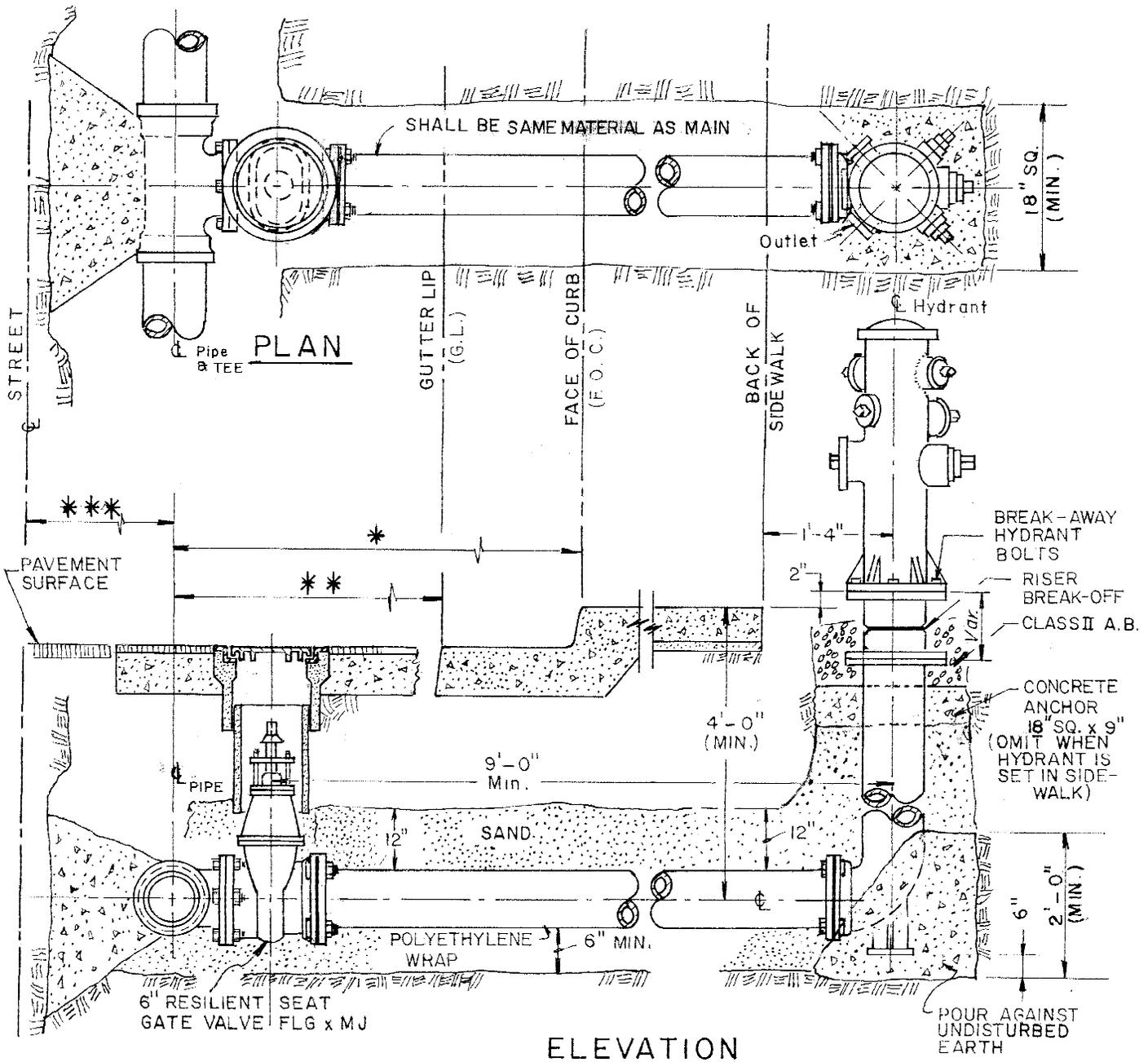


 DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-04

SCALE:
 NONE

DATE:
9/13/11



NOTE

A blue fire hydrant marker of Stimsonite 88 or equal shall be installed in the street marking the location of each hydrant (public or private) 12" from the centerline on the hydrant side on the centerline.

Installation details will be furnished by the Fire Prevention Bureau.

Wrap all metallic surfaces below ground with polyethylene 8 mils min. around pipe sections, 16 min. around fittings and valves.

WATERMAIN REPLACEMENT PROJECTS

- * 7'-6" As directed by Engineer
 - ** 1'-9" Minimum for 18" trench
 - ** 2'-0" Minimum for 24" trench
 - ** 2'-3" Minimum for 30" trench
- NEW SUBDIVISIONS**
- *** 10'-0" South or East of street centerline



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
FIRE HYDRANT INSTALLATION
WATER DISTRIBUTION SYSTEM**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

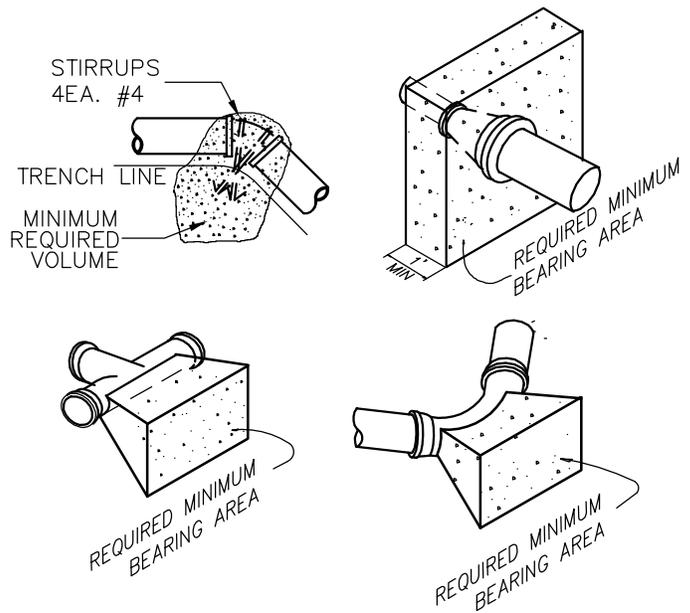
DRAWING NO:

4-05

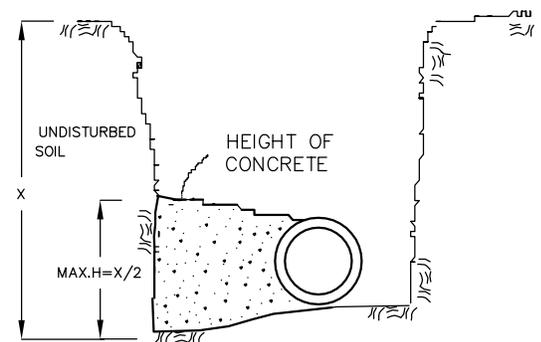
SCALE:
NONE

DATE:
9/13/11

THRUST BLOCK MINIMUM BEARING AREA REQUIRED (SQ. FT.)					ANCHOR BLOCK MIN. VOLUME (CU. YDS.)
PIPE SIZE	FITTING	S.C.	M.C. OR L.G.S.	H.C. OR M.G.S.	
4"	11 1/4" BEND	1	1	1	0.2
4"	22 1/2" BEND	2	2	2	0.3
4"	45° BEND	3	2	2	0.5
4"	90° BEND	5	3	2	0.5
4"	TEE/CROSS	4	2	2	0.5
4"	CAP/B.O.	5	3	2	0.5
4"	OFF-SET	-	-	-	0.5
6"	11 1/4" BEND	2	1	1	0.3
6"	22 1/2" BEND	3	2	2	0.5
6"	45° BEND	7	3	2	1.0
6"	90° BEND	12	4	3	1.5
6"	F.H. BURY	12	4	3	-
6"	TEE/CROSS	9	3	3	1.0
6"	CAP/B.O.	12	4	3	1.5
6"	OFF-SET	-	-	-	1.0
8"	11 1/4" BEND	3	2	1	0.5
8"	22 1/2" BEND	5	3	2	1.0
8"	45° BEND	10	4	3	2.0
8"	90° BEND	18	7	4	2.5
8"	TEE/CROSS	12	5	4	1.5
8"	CAP/B.O.	18	7	4	2.5
8"	OFF-SET	-	-	-	2.0
12"	11 1/4" BEND	6	3	2	1.0
12"	22 1/2" BEND	12	5	3	2.0
12"	45° BEND	23	9	5	4.0
12"	90° BEND	45	16	9	5.5
12"	TEE/CROSS	32	12	5	3.5
12"	CAP/B.O.	45	16	9	5.5
12"	OFF-SET	-	-	-	4.0
12x8	REDUCER	18	9	6	-
12x6	REDUCER	24	12	8	-
12x4	REDUCER	28	14	9	-
8x6	REDUCER	6	3	2	-
8x4	REDUCER	10	5	3	-
6x4	REDUCER	4	2	1	-



TYPICAL ANCHOR BLOCK-FITTING



TYPICAL SECTION
THRU THRUST BLOCK

SOIL IDENTIFICATION CHARACTERISTICS

- S.C. - SOFT CLAY -MOLDED BY LIGHT FINGER PRESSURE
- M.C. - MEDIUM CLAY -MOLDED BY STRONG FINGER PRESSURE
- H.C. - HARD CLAY -DIFFICULT TO INDENT BY THUMB NAIL
- L.G.S. - LOOSE GRANULAR SOIL -EASILY EXCAVATED WITH SHOVEL
- M.G.S. - MEDIUM GRANULAR SOIL -DIFFICULT TO EXCAVATE WITH SHOVEL

NOTES:

1. THRUST BLOCKS AND ANCHOR BLOCKS SHALL BE CONSTRUCTED WITH 3000 PSI (MIN) CONCRETE AND SHALL BE POURED AGAINST UNDISTURBED SOIL. WHERE UNDISTURBED SOIL IS NOT AVAILABLE, SIZE THE THRUST BLOCK ACCORDING TO THE VOLUME OF CONCRETE AS REQUIRED FOR AN ANCHOR BLOCK
2. NO CONCRETE SHALL BE PLACED BEYOND THE FACE OF THE BELL EXCEPT ANCHOR BLOCKS.
3. POLYWRAP FITTINGS IN ACCORDANCE WITH CITY OF VALLEJO STANDARD SPECIFICATIONS.
4. THRUST BLOCK AREA REQUIRED IS BASED ON 175 PSI TEST PRESSURE.
5. ANCHOR BLOCK FITTINGS SHALL BE SECURED WITH #4 REBAR- 4@.
6. RESTRAINED JOINTS MAY BE USED WITH ANCHOR BLOCK ASSEMBLIES.
7. THRUST RESTRAINT DESIGN FOR 14"Ø & LARGER SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL



CITY OF VALLEJO STANDARD DETAIL
STANDARD
THRUST BLOCK & ANCHOR BLOCK DETAILS
DETAILS FOR 4", 6", 8" & 12" FITTINGS

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

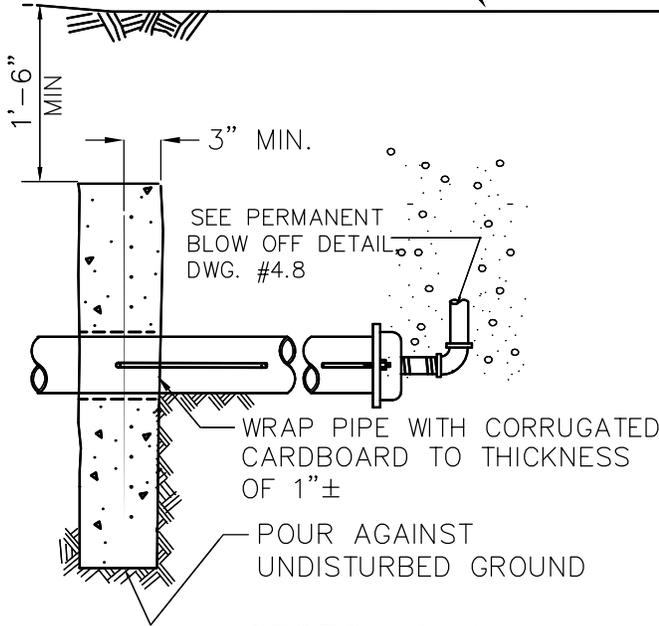
DRAWING NO:

4-06

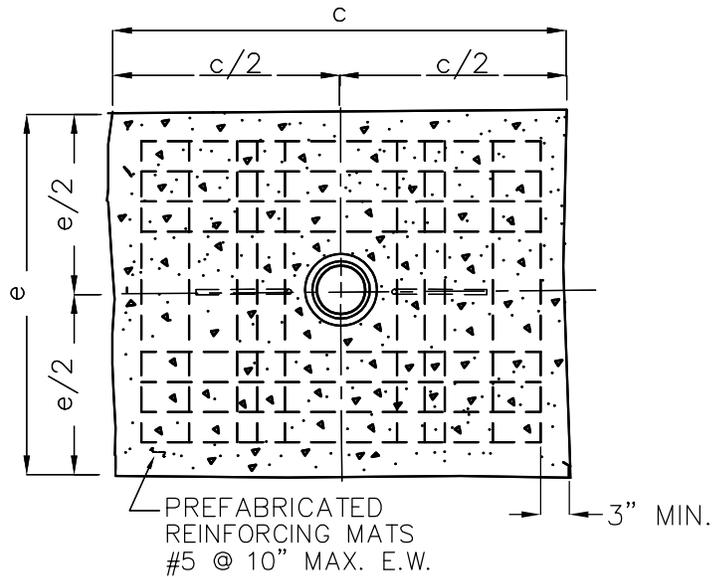
SCALE:
NONE

DATE:
9/13/11

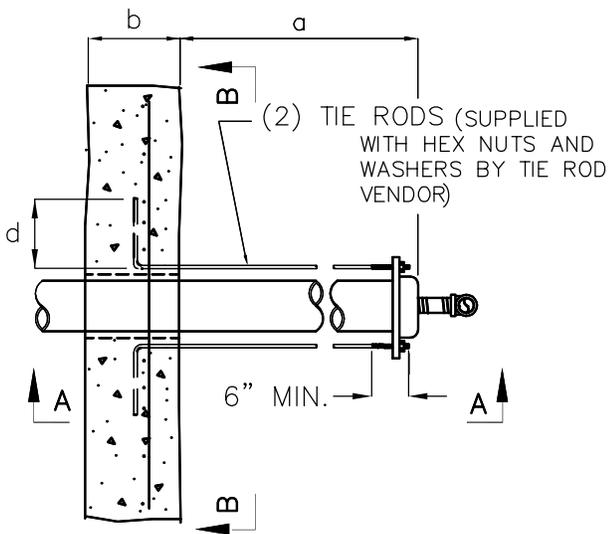
GROUND SURFACE OR FINISHED STREET GRADE



SECTION A-A



SECTION B-B



PLAN

Notes:

1. WORKING PRESSURES SHALL NOT EXCEED PRESSURES AS INDICATED ON THE SCHEDULE TABLE
2. ANCHOR TIE ROD STOCK SHALL BE A-36 STEEL OR APPROVED EQUIVALENT, AND REINFORCING BARS TO BE GRADE 60 STEEL
3. APPLY MASTIC IN ACCORDANCE WITH CITY OF VALLEJO SPECIFICATIONS
4. CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS
5. HORIZONTAL MAT BARS MAY BE TEMPORARILY REMOVED AND REPLACED TO PERMIT PIPE PLACEMENT
6. 2"Ø BLOW OFF PIPING SHALL BE AS DETAILED IN DRAWING #4.8 "PERMANENT BLOW OFF"
7. TEMPORARY BLOW-OFFS ARE REQUIRED AT THE ENDS OF ALL NEW LINES PLANNED FOR FUTURE EXTENSION. FUTURE DATE.

DIAMETER OF PIPE (in)	ALLOWABLE PRESS (psi)	TIE ROD BLANK DIMENSION	DIMENSIONS				
			a	b	c	d	e
6	0-150	5/8"x6'-6"	5'-0"	1'-0"	3'-0"	6'	3'-0"
8	0-150	5/8"x7'-6"	6'-0"	1'-0"	3'-6"	6'	3'-6"
12	0-150	7/8"x10'-0"	7'-9"	1'-0"	6'-1"	1'-3"	4'-9"



CITY OF VALLEJO STANDARD DETAIL

STANDARD REVERSE ANCHOR AND TEMPORARY BLOW OFF

APPROVED BY:

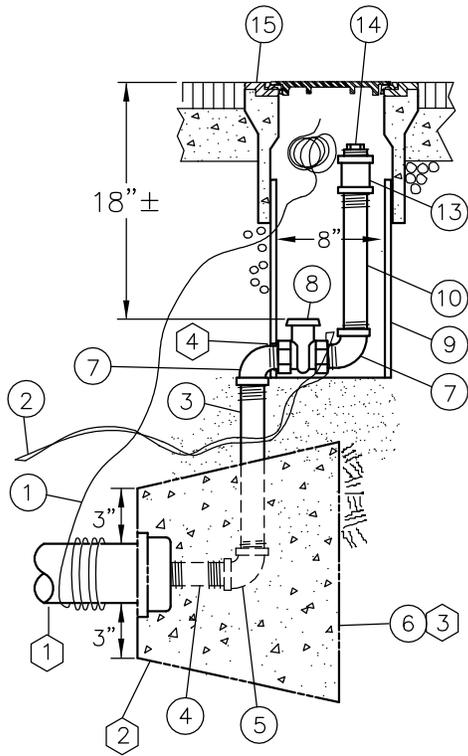
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

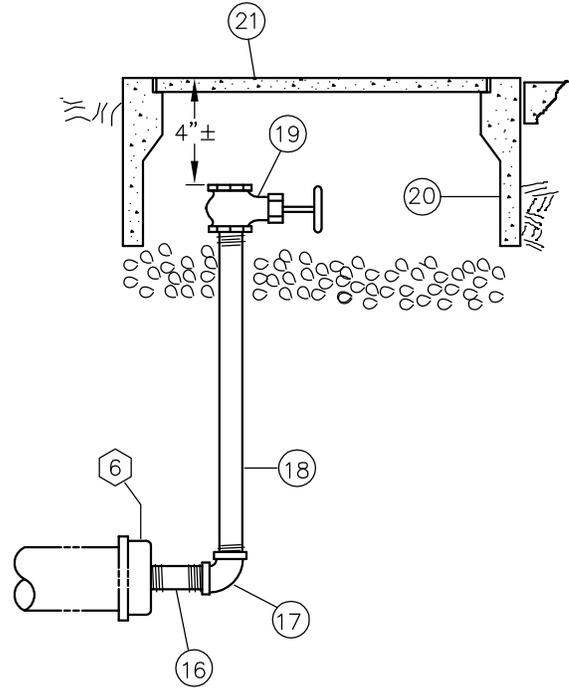
4-07

SCALE:
NONE

DATE:
9/13/11



PERMANENT



TEST

ITEM	MATERIAL DESCRIPTION
1	#10 TRACER WIRE(ALL MAINS)
2	BLUE CAUTION TAPE, 3" WIDE
3	NIPPLE, 2"Ø x VARIES, RED BRASS
4	NIPPLE, 2"Ø x 3" PVC SCH 80
5	90°ELBOW, 2"Ø RED BRASS
6	CONC. THRUST BLOCK (SEE DWG. 4-06)
7	90° STREET ELBOW, 2"Ø RED BRASS
8	BALL VALVE W/ TEE HEAD, 2"Ø IPT x IPT
9	6" COMPACTED SAND
10	NIPPLE, 2"Ø x 14", RED BRASS
11	DELETED

ITEM	MATERIAL DESCRIPTION
12	NIPPLE, 2"Ø x 6" RED BRASS
13	COUPLING, 2"Ø RED BRASS
14	HEX HEAD PLUG, 2"Ø PVC (HAND TIGHT)
15	VALVE BOX, CHRISTY G-5 OR EQUAL
16	NIPPLE, 2"Ø x VARIES GALV. IRON
17	90° ELBOW, 2"Ø GALV. IRON
18	NIPPLE, 2"Ø x VARIES GALV. IRON
19	GATE VALVE, 2"Ø BRASS
20	METER BOX, CHRISTY B-9 OR EQUAL
21	METAL TRAFFIC LID "B9C"
22	DELETED

NOTES:

- ① MAIN SIZE: 6"Ø TO 14"Ø
- ② CAP OR PLUG SHALL HAVE 2"Ø TAP.
- ③ THRUST BLOCK SHALL BE POURED AGAINST UNDISTURBED EARTH. WHEN UNDISTURBED EARTH IS NOT EXISTING, USE ANCHOR BLOCK DIMENSIONS.
- ④ CUT SLOTS IN RISER TO ACCOMODATE PIPING.
- ⑤ TEST BLOWOFFS SHALL BE INSTALLED AT THE ENDS OF ALL NEW LINES FOR USE IN PRESSURE TESTING AND BACTERIA SAMPLING.
- ⑥ THRUST RESTRAINT FOR TEST BLOW-OFFS SHALL BE AT CONTRACTOR'S OPTION.
- ⑦ PERMANENT BLOW-OFFS ARE REQUIRED AT THE ENDS OF ALL NEW LINES.



CITY OF VALLEJO STANDARD DETAIL

STANDARD 2"Ø BLOW OFF ASSEMBLY

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

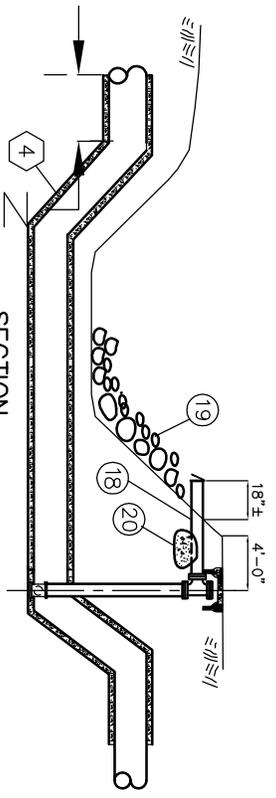
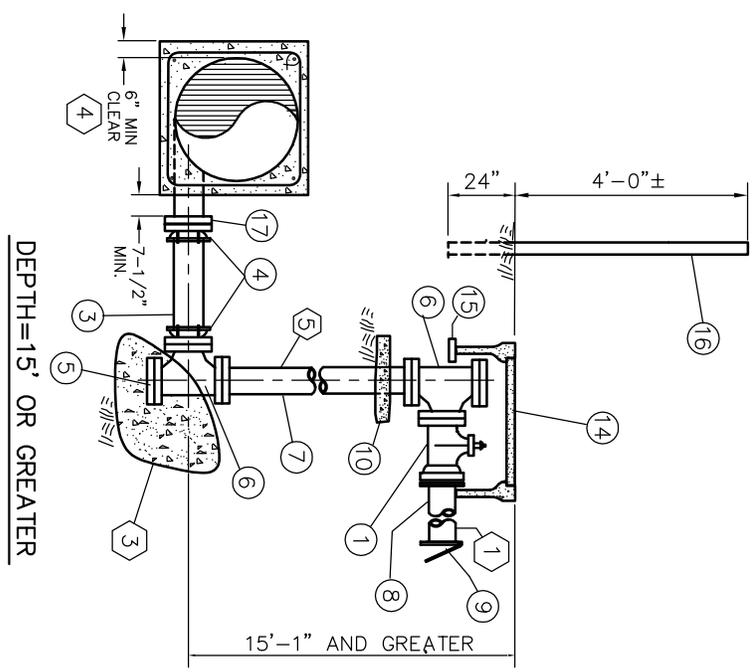
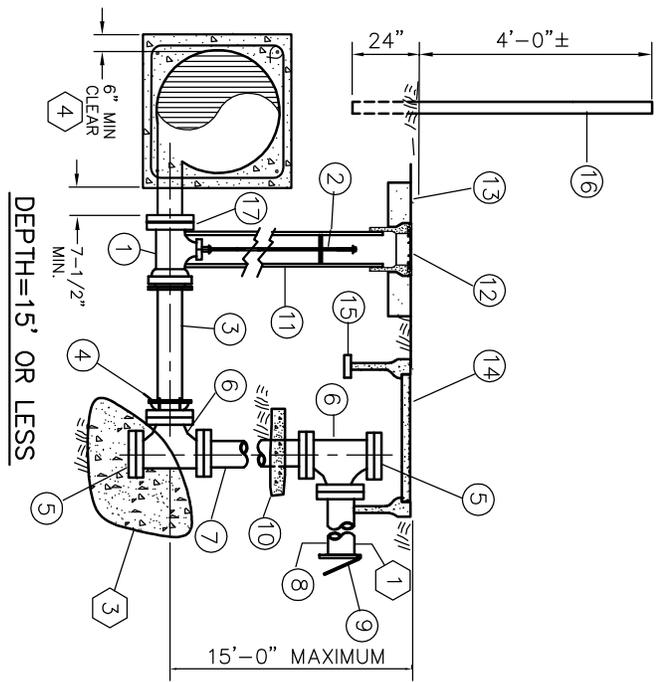
DRAWING NO:

4-08

SCALE:
NONE

DATE:
9/13/11

ITEM	MATERIAL DESCRIPTION
1	6" RES. SEATED G.V., F&M
2	VALVE NUT EXTENSION
3	6" DIP, PEKPE
4	6" FLANGE COUPLING ADAPTER
5	6" BLIND FLANGE
6	6" TEE, F&F
7	6" DIP, F&F
8	6" FLAP VALVE, RESTRAINED
9	CONCRETE COLLAR, 9" THICK
10	VALVE RISER, 6" PVC
11	VALVE BOX, CHRISTY G-5
12	CONCRETE COLLAR, 6" THICK
13	METER BOX, CHRISTY B-36
14	BRICK, COMMON CLAY
15	4x6 TREATED DOUGLAS FIR
16	6" FLANGE INSULATION KIT
17	6" DIP, PEKPE
18	LIGHT RIP-RAP, 18" THICK
19	PIPE SUPPORT, CONCRETE 2 CU.FT.
20	



- NOTES:
- ① BLOW OFF PIPE SHOWN ROTATED FOR CLARITY
 - ② SEE CITY OF VALLEJO STANDARD TRENCH DETAIL FOR BACKFILL REQUIREMENTS
 - ③ SEE C.O.V. STANDARD THRUST BLOCK REQUIREMENTS
 - ④ REINFORCING DETAILS FOR CONCRETE ENGAGEMENT SHALL BE SUBMITTED FOR APPROVAL.
 - ⑤ MJ COUPLING WITH "MEGAL-LUG" RESTRAINED GLANDS ARE PERMITTED WHEN APPROVED BY CONSTRUCTION INSPECTOR.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
6" BLOW OFF ASSEMBLY
(UNIMPROVED AREAS)**

APPROVED BY:

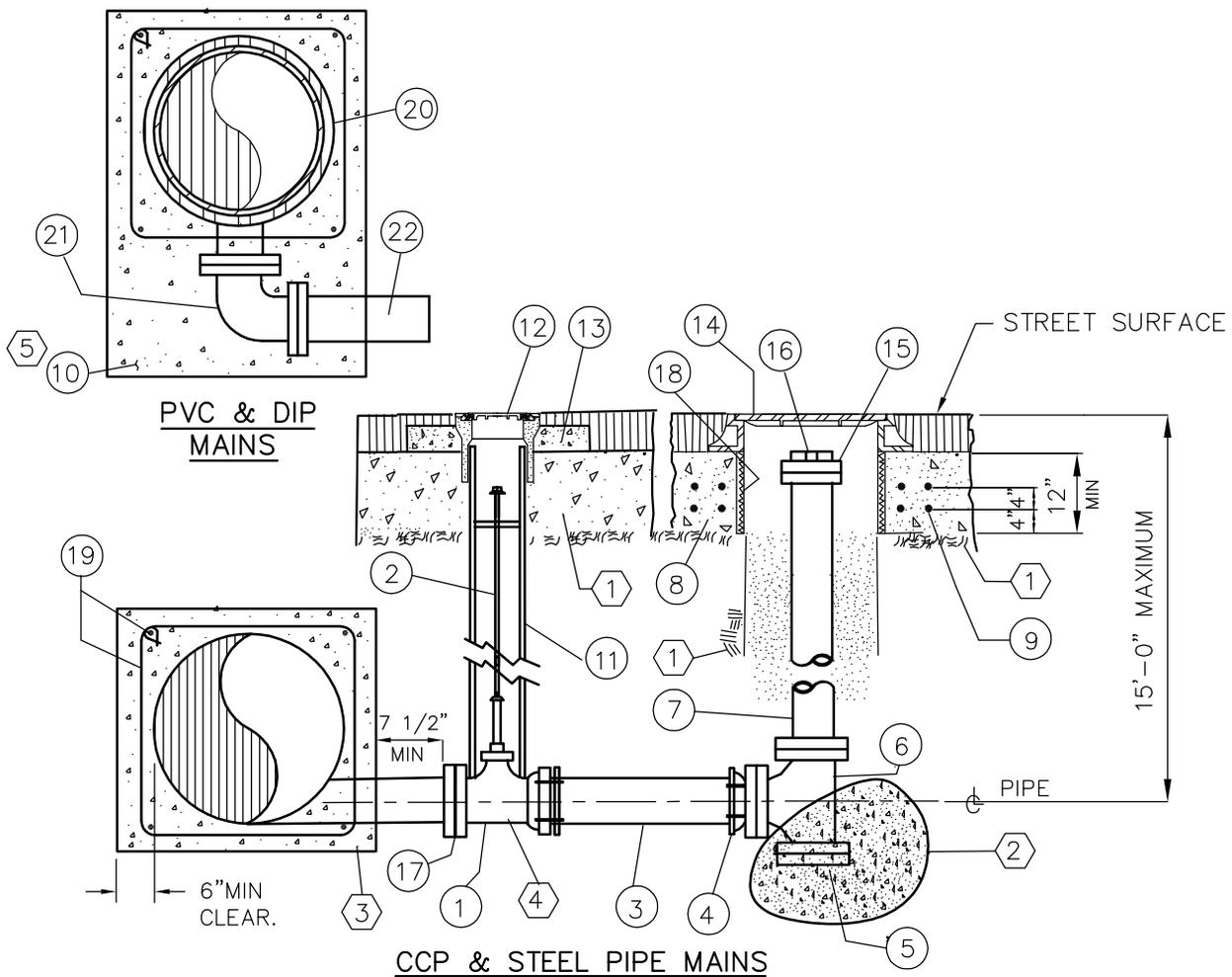


DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-09

SCALE:
NONE

DATE:
9/13/11



ITEM	MATERIAL DESCRIPTION
1	6"Ø RES.SEAT G.V., FxMJ
2	VALVE NUT EXTENSION
3	6"ØDIP, PExPE
4	6"Ø FLANGE COUPLING ADAPTER
5	6"Ø BLIND FLANGE
6	6"Ø TEE, FxF
7	6"Ø DIP, FxF
8	CONCRETE COLLAR, 3'-6" SQUARE
9	REINFORCING BAR, #4x3' LONG
10	CONCRETE ENCASEMENT
11	8"Ø VALVE RISER, PVC

ITEM	MATERIAL DESCRIPTION
12	VALVE BOX, CHRISTY G-5
13	CONCRETE COLLAR, 6" THICK
14	MANHOLE, 24"Ø
15	COMPANION FLANGE, 6"ØIPT
16	6"Ø TANK PLUG, IPT
17	6"Ø FLANGE INSULATION KIT
18	24"Ø FIBER TUBE FORM
19	REINFORCING BAR
20	TEE, BELL x FLANGE
21	90° ELBOW, 6"Ø -FxF
22	6" FLANGE x PE SPOOL, 12" LG

NOTES:

- ① SEE CITY OF VALLEJO STANDARD TRENCH DETAIL FOR BACKFILL REQUIREMENTS
- ② SEE CITY OF VALLEJO STANDARD DETAIL FOR THRUST BLOCK REQUIREMENTS
- ③ RE-INFORCING DETAILS FOR CONCRETE ENCASEMENT SHALL BE SUBMITTED FOR APPROVAL
- ④ ON PVC & DIP MAINS, GATE VALVE SHALL BE MJ x MJ
- ⑤ CONCRETE ENCASEMENT SHALL BE AS REQUIRED BY THE ENGINEER. MINIMUM ENCASEMENT AT ELBOW SHALL BE 6".



CITY OF VALLEJO STANDARD DETAIL

**6" BLOW OFF ASSEMBLY
(IMPROVED AREAS)**

APPROVED BY:

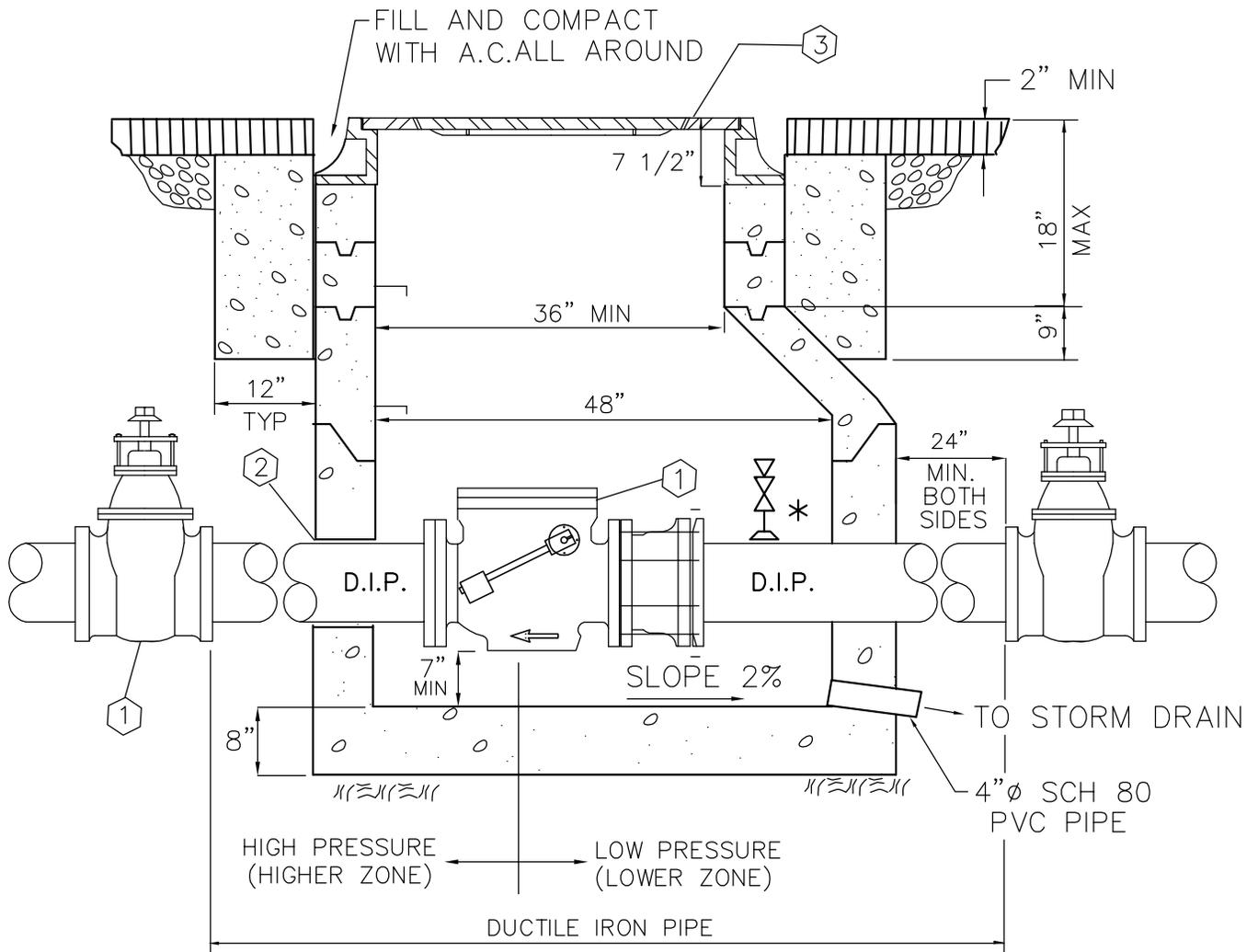
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

4-10

SCALE:
NONE

DATE:
9/13/11



- * LEAK TEST TAP
- 3/4" x 1/2" INSULATING BUSHING
- 1/2" BRASS NIPPLE
- 1/2" BRASS BALL VALVE
- 1/2" BRASS PLUG

GENERAL NOTES

- ① CHECK VALVE SHALL HAVE FLANGED ENDS WITH ANSI B16.1 125 LB. DRILLING.
- ② FLANGE COUPLING ADAPTER PERMITTED ON LOW-PRESSURE SIDE ONLY
- ③ FILL ANNULAR SPACE AROUND MAIN WITH DRY PACKED MORTAR
- ④ FOR MANHOLE COVER, USE 36"Ø DOUBLE LID LABELLED "WATER" (SIMILAR TO VS & FCD DRAWING # 27)
- ⑤ LADDER RUNGS SHALL CONFORM TO OSHA STANDARDS. SPACING SHALL NOT EXCEED 12"
- ⑥ CHECK VALVE SHALL BE LINED AND COATED WITH MINIMUM OF 8 MILS OF FACTORY APPLIED EPOXY
- ⑦ CHECK VALVE SHALL BE "APCO 6000CLW" WITH BUNA-N DISC SEAT AND STAINLESS STEEL TRIM, OR APPROVED EQUAL
- ⑧ ISOLATION VALVES SHALL BE DOUBLE DISC GATE VALVES FOR 6" TO 12" MAIN SIZES (OR APPROVED RESILIENT SEAT GATE VALVE).



CITY OF VALLEJO STANDARD DETAIL

CHECK VALVE ASSEMBLY

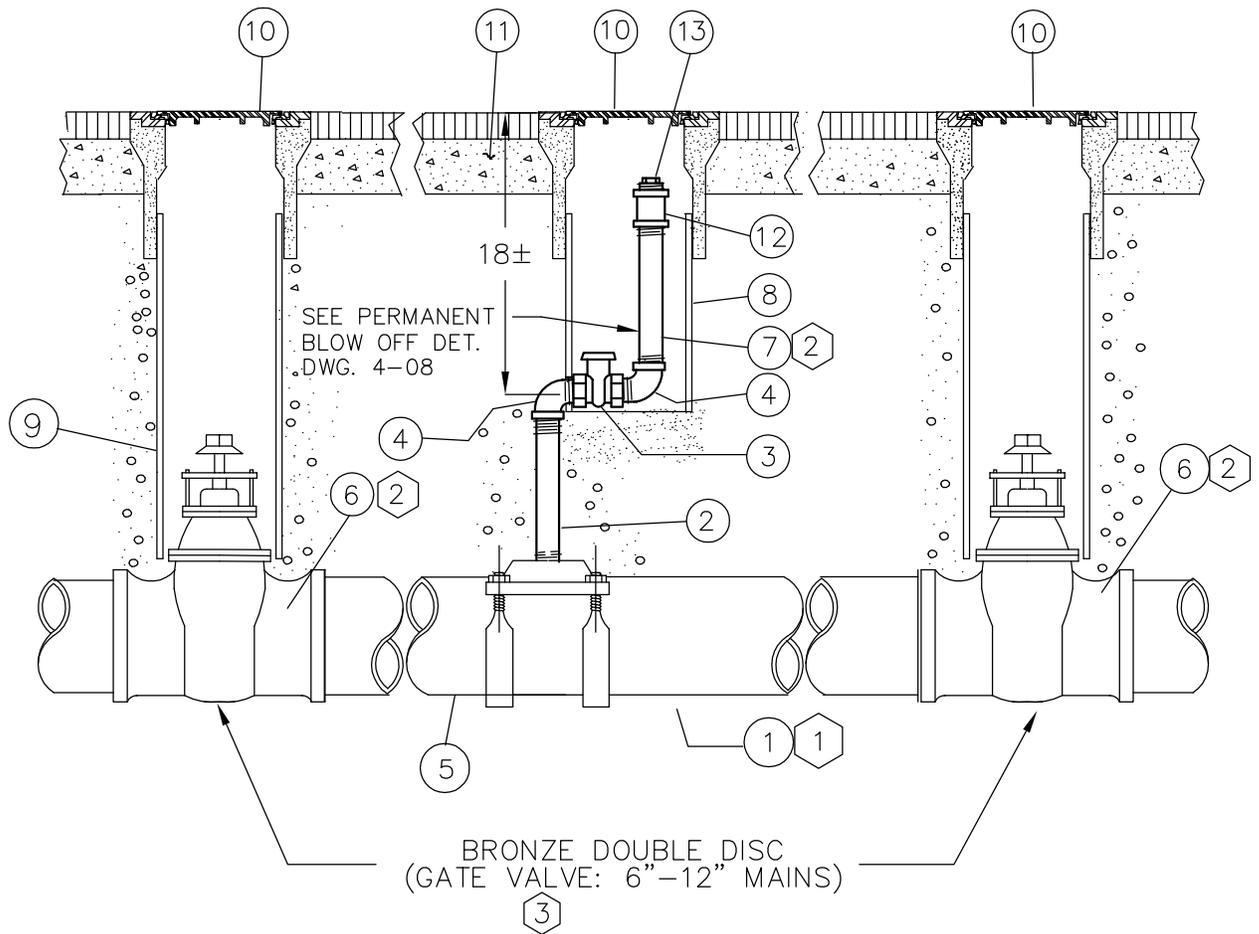
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-11

SCALE:
NONE

DATE:
9/13/11



ITEM	MATERIAL DESCRIPTION
1	DOUBLE STRAP BRONZE SADDLE W/ 2" TAP
2	NIPPLE, 2"Ø x VARIES, RED BRASS (SEE DWG 4-08)
3	2"Ø BALL VALVE, BRASS (SEE DWG 4.8)
4	90° STREET ELBOW, 2"Ø, RED BRASS
5	SPOOL, PE x PE, 4'-0" LONG
6	DOUBLE DISC GATE VALVE (ALL MAINS) SEE NOTE 3
7	NIPPLE, 2"Ø x 6", RED BRASS
8	RISER-8"Ø x 1'-0", PVC, C-900 (SEE DWG. 4-08)
9	RISER-8"Ø x VARIES, PVC, C-900
10	METER BOX, "CHRISTY G-5, OR EQUAL
11	CONCRETE COLLAR
12	2"Ø BRASS COUPLING
13	HEX HEAD PLUG, 2"Ø PVC (HAND TIGHT)

NOTES:

- ① SEE STANDARD 2" WATER SERVICE CONNECTION DETAIL FOR CORROSION PROTECTION REQUIREMENTS.
- ② MAIN LINE VALVES SHALL BE NORMALLY CLOSED. 2" BALL VALVE SHALL BE NORMALLY OPEN
- ③ MUELLER RESILIENT SEAT GATE VALVES MAY BE USED IN LIEU OF DOUBLE DISC GATE VALVE



CITY OF VALLEJO STANDARD DETAIL

ZONE VALVE ASSEMBLY

APPROVED BY:

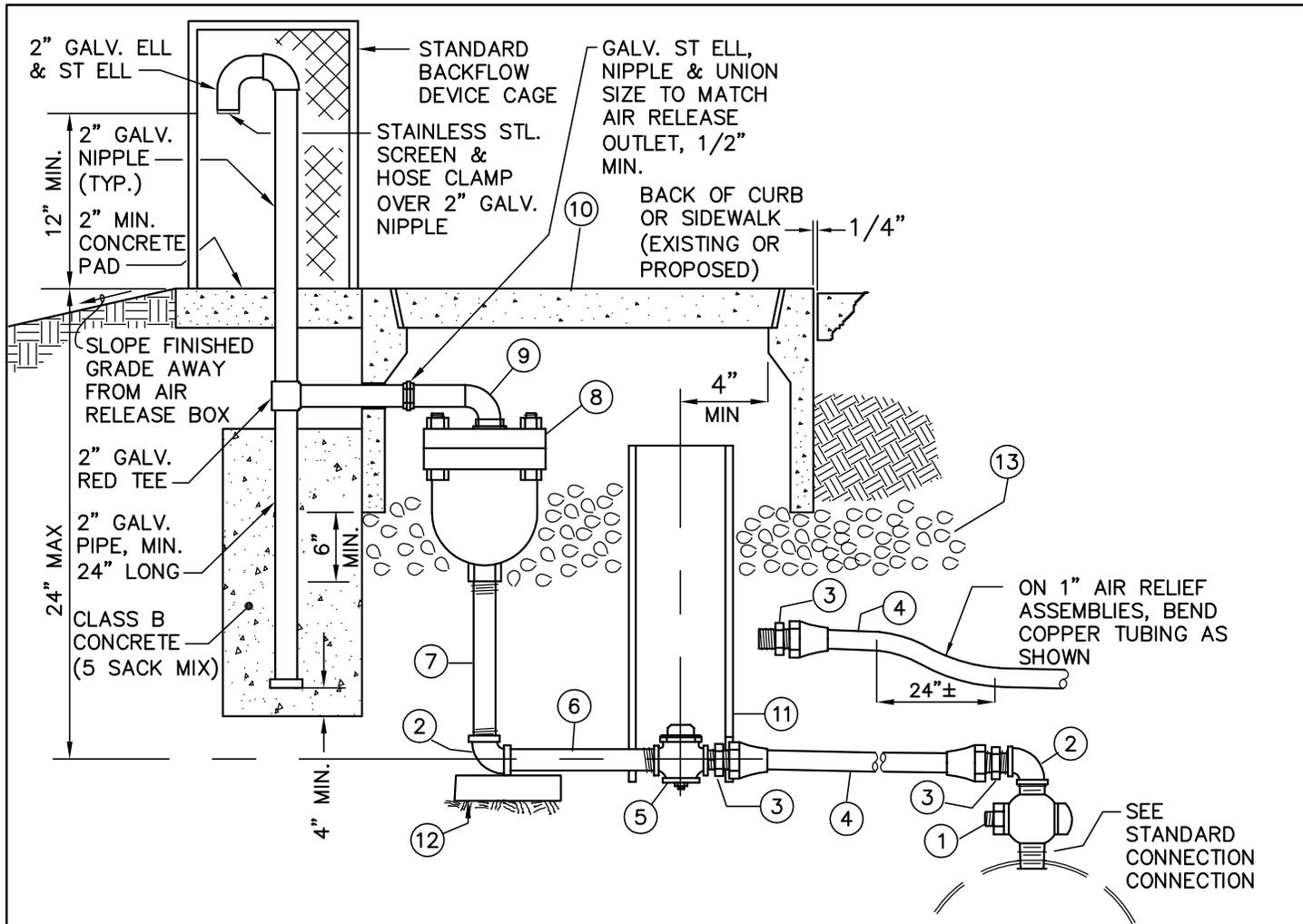
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

4-12

SCALE:
NONE

DATE:
9/13/11



ITEM	DESCRIPTION	SIZE
1	CORPORATION STOP	1" 2"
2	90° ELBOW(BRASS)	1" 2"
3	ADAPTER (IPT X COMP)	1" 2"
4	COPPER TUBING	1" 2"
5	CURB STOP (BRONZE)	1" 2"
	BALL VALVE (BRONZE)	
6	4" NIPPLE (BRASS)	1" 2"
7	NIPPLE (PVC SCH 80)	1" 2"

ITEM	DESCRIPTION	SIZE
8	AIR RELEASE VALVE	1" 2"
	COMBINATION: AIR/VAC	
9	90° ELBOW (PVC)	1" 2"
10	METER BOX B-16	1" -
	METER BOX B-36	- 2"
11	6" PVC Pipe w/ slot	- -
12	BRICK	- -
13	6" CLASS II AB	- -

- NOTES:**
1. MAINTAIN AN UPWARD GRADE FROM CORPORATION STOP AT MAIN TO AIR VALVE (2% MIN.)
 2. INSTALL AT LOCATION DIRECTED BY THE ENGINEER
 3. LINE AND COAT AIR VALVE WITH 8 MILS (MIN) FACTORY APPLIED EOPXY.
 4. CONCRETE COATING AND LINING, DAMAGED BY INSTALLATION OF WELDED COUPLINGS, SHALL BE REPAIRED WITH FIELD APPLIED CEMENT MORTAR AS APPLICABLE.
 5. FOR COPPER TUBING, USE TYPE "K" ASTM B-88-55, SOFT COPPER.
 6. METER BOX SHALL BE AS MANUFACTURED BY "CHRISTY" OR APPROVED EQUAL.
 7. AIR RELEASE VALVE SHALL BE "APCO" MODEL 143C OR APPROVED EQUAL.

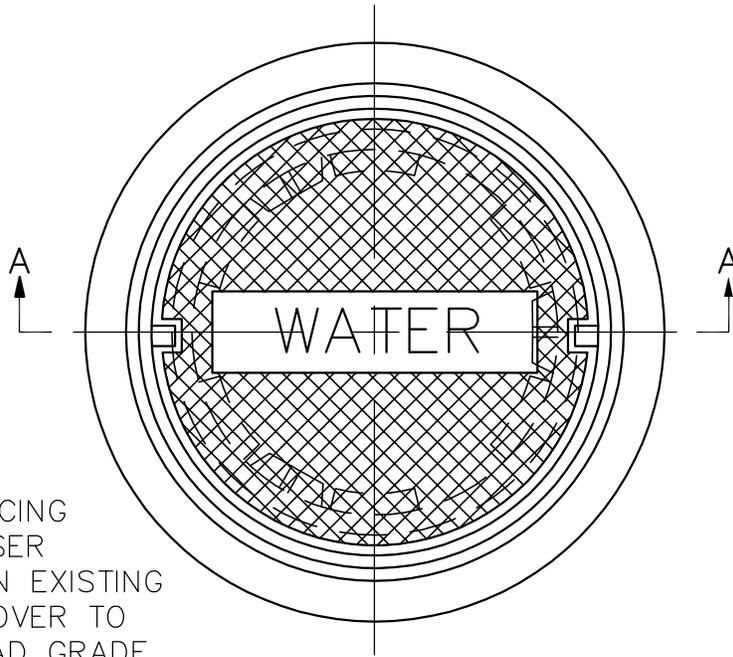


CITY OF VALLEJO STANDARD DETAIL
**1" & 2" AIR RELIEF VALVE
 COMBINATION AIR/VACUUM
 AND AIR RELEASE VALVE**

APPROVED BY:


 DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-13
 SCALE:
 NONE
 DATE:
 9/13/11



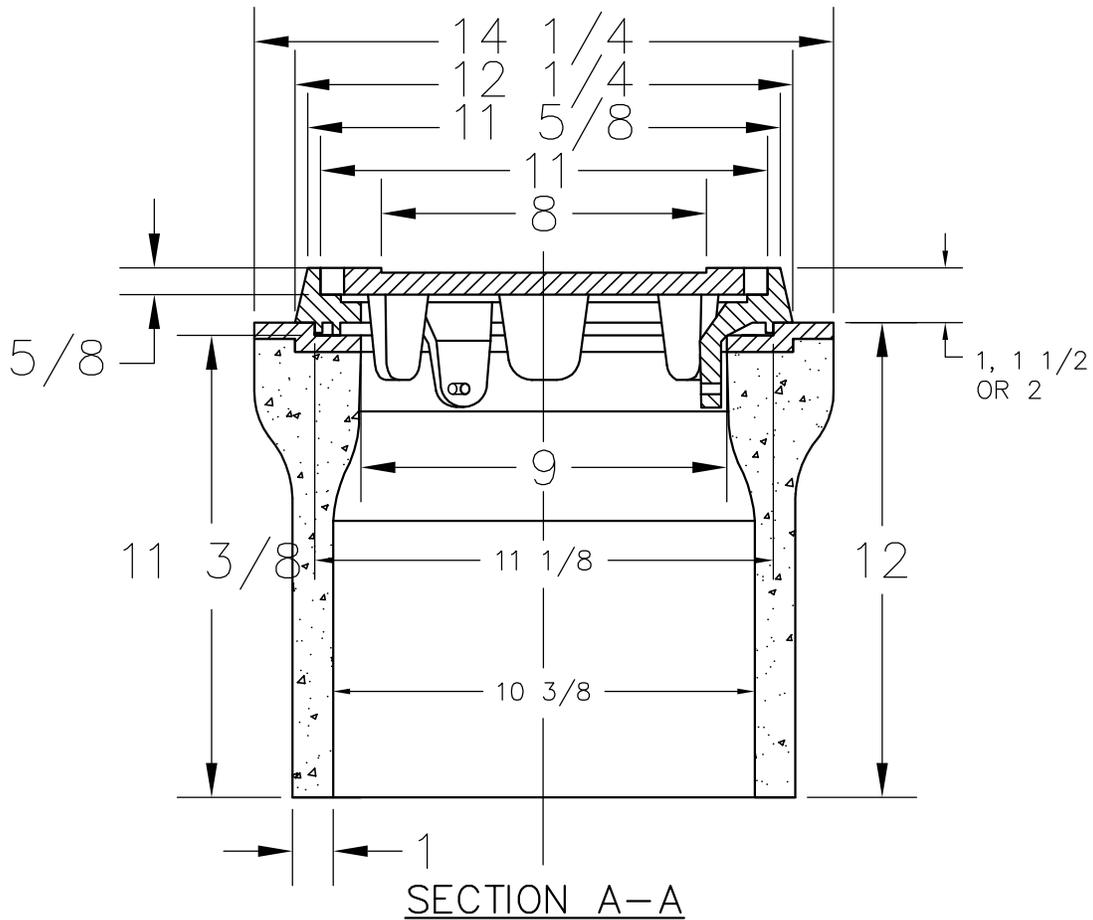
PLAN

NOTES

1. WHEN RESURFACING ROAD, ADD RISER RING BETWEEN EXISTING FRAME AND COVER TO MEET NEW ROAD GRADE.
2. BASE AND INSTALLATION TO BE AS SHOWN ON CITY STD. DWG. 4-14.

WEIGHTS

BOX 61 LBS.
COVER 10 LBS.



SECTION A-A



CITY OF VALLEJO STANDARD DETAIL

**VALVE ASSEMBLY
WATER VALVE BOX**

APPROVED BY:

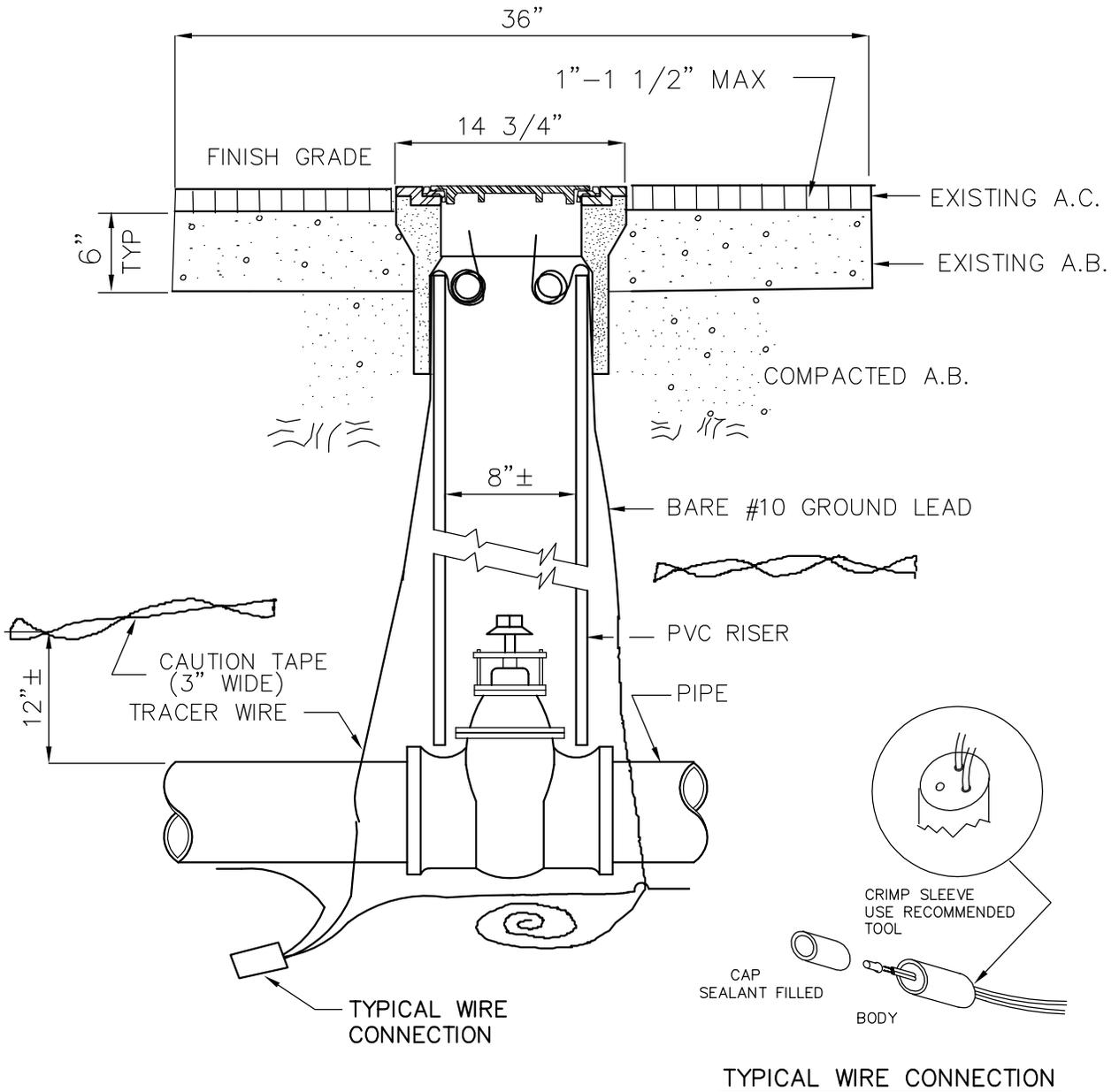
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

4-14A

SCALE:
NONE

DATE:
9/13/11



VALVE COATING

WRAP ENTIRE VALVE, TO OPERATING NUT, WITH POLYWRAP, 16 MILS MINIMUM.

TRACER WIRE

ALL PIPES INCLUDING D.I.P. SHALL HAVE A TRACER WIRE, (#10 SOLID COPPER TW OR THHN), LAID ON THE TRENCH BOTTOM AND CENTERED UNDER THE PIPE. A CONTACT LEAD SHALL BE PROVIDED INSIDE THE VALVE POT AT ALL VALVE LOCATIONS A BARE #10 COPPER GROUND LEAD SHALL BE PROVIDED AS SHOWN. TRACER WIRE MAY BE LOOPED INSIDE VALVE BOX AT IN-LINE VALVES.

CAUTION TAPE

LOCATOR TAPE SHALL BE BLUE PLASTIC TAPE, 3" WIDE, MARKED "WATER LINE BURIED BELOW". LAY TAPE 12" ABOVE PIPE.



CITY OF VALLEJO STANDARD DETAIL

**VALVE ASSEMBLY
& TRACKER WIRE INSTALLATION**

APPROVED BY:

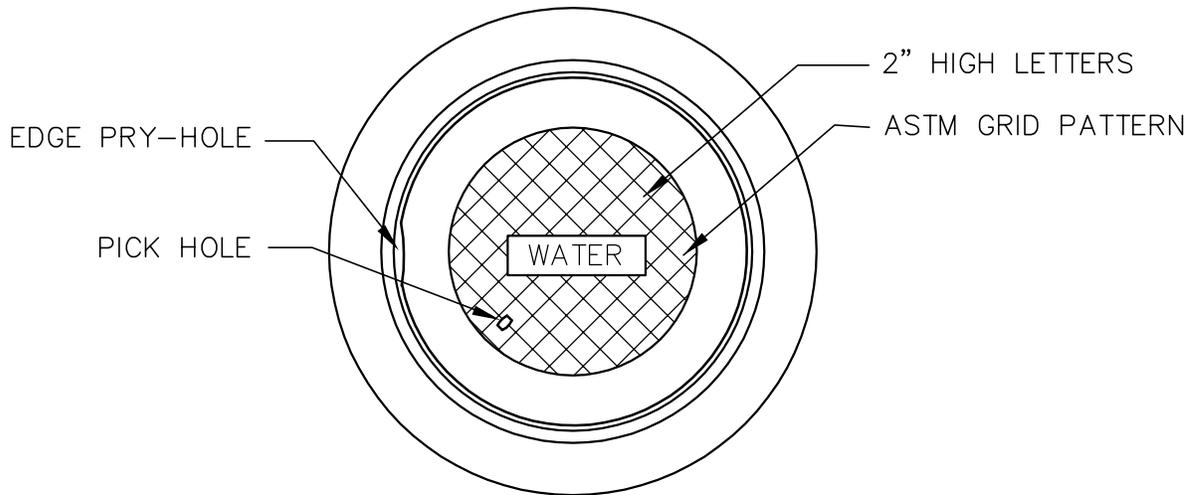
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

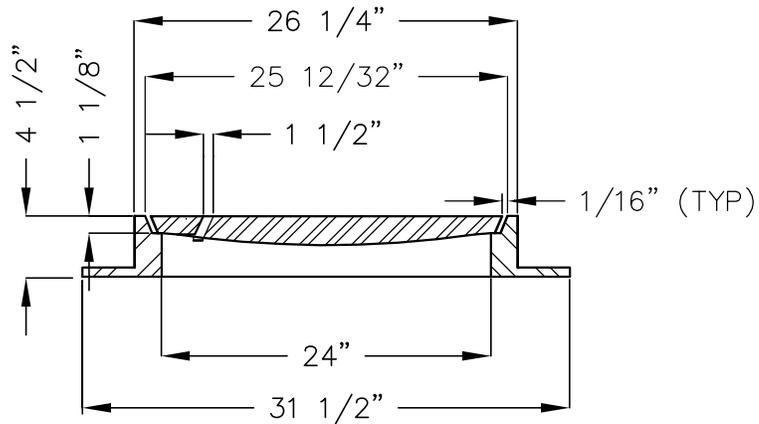
4-14

SCALE:
NONE

DATE:
9/13/11



PLAN



SECTION

GENERAL NOTES

1. FRAME AND COVER SHALL BE DESIGNED FOR H-20 HIGHWAY LOADING
2. ALL MATERIALS USED IN MANUFACTURING SHALL CONFORM TO ASTM 48-30
3. FRAME AND COVER SHALL BE MACHINED ON BEARING SURFACES TO ASSURE CLOSE, QUIET FIT
4. CASTINGS SHALL BE DIPPED IN BLACK BITUMINOUS PAINT
5. FRAMES AND COVERS LARGER THAN 24" SHALL BE FULL TRAFFIC, HEAVY DUTY



CITY OF VALLEJO STANDARD DETAIL

MANHOLE FRAME & COVER, 24"

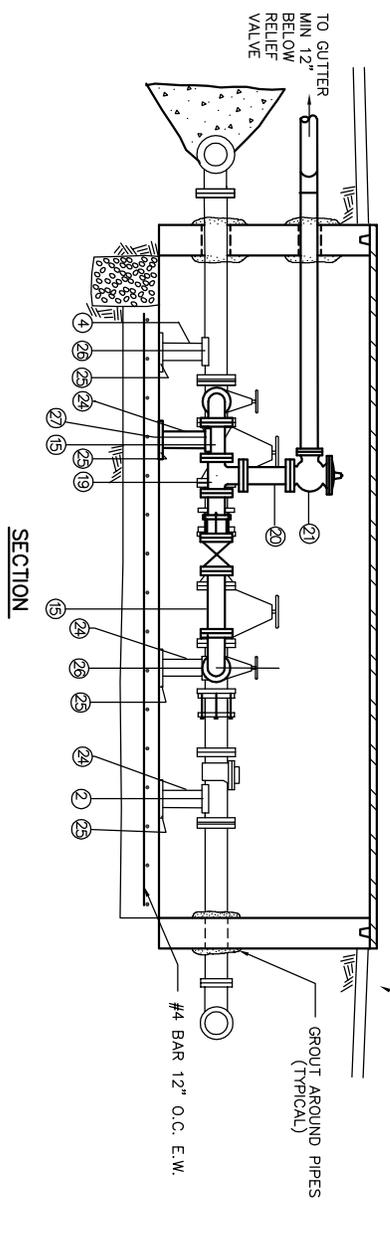
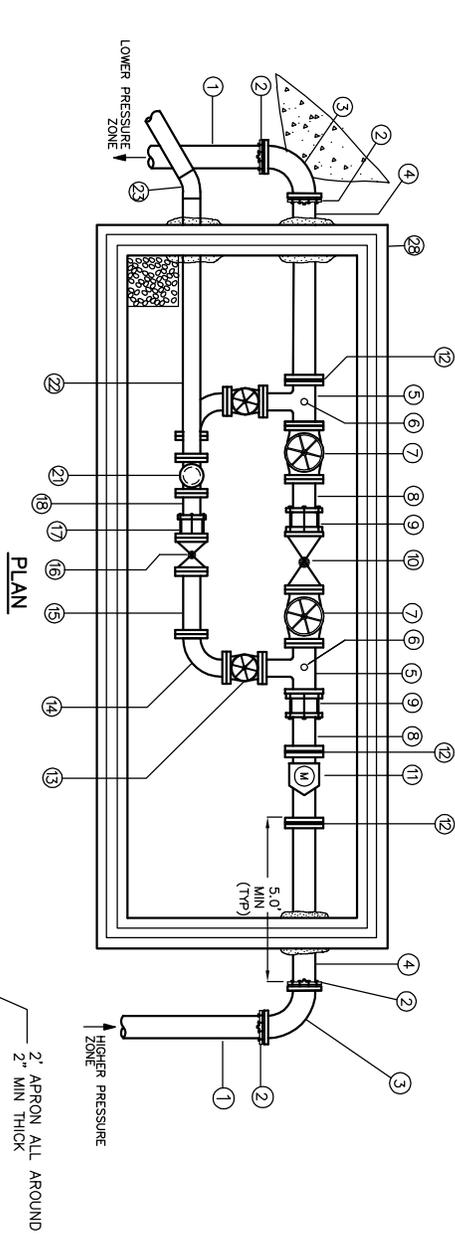
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO: 4-15
SCALE: NONE
DATE: 9/13/11

MATERIAL LIST

1. 6" MORTAR LINED AND D.I. PIPE FLANGE BY PLAIN END C/F - 2 REQUIRED
2. 6" MECHANICAL JOINT RESTRAINT DEVICE EBAA IRON MEGALUG OR EQUAL - 4 REQ
3. MORTAR LINED MAMU DIP ELBOW - 2 REQ
4. 6" FLANGED BY PLAIN END DUCTILE IRON PIPE SPOOL - 2 REQ
5. 6"x6"x4" FUSION BONDED EPOXY LINED AND COATED WELDED STEEL FLANGED TEE WITH GASKETS - 2 REQ
6. 3/4" WELDING OUTLET WITH 3/4"x1/2" PVC BUSHING
7. 3/4" WELDED BRONZE BUSHING VALVE AND MATERIAL GAGE BRONZE BUSHING VALVE ASHEROFF "COMBIBAL SERIES" OR EQUAL (RANGE 0-200 PSI) PRESSURE GAUGES 4" Ø GLYCERINE FILLED - 2 REQ
8. 6" 15# FLANGE & FLANGE NON-RISING STEM FUSION BONDED EPOXY LINED AND COATED RESILIENT WEDGE FLANGED GATE VALVE WITH GASKETS AND HARD WHEEL PER AWWA C509-80 SPECIFICATIONS - 2 REQ
9. 6" FUSION BONDED EPOXY LINED AND COATED FLANGED BY PLAIN END WELDED STEEL PIPE - 2 REQ
10. 6" FUSION WELDED EPOXY LINED AND COATED FLANGE COUPLING ADAPTER - 2 REQ. (ALL FLANGED COUPLING ADAPTERS SHALL BE RESTRAINED IN ACCORDANCE TO AWWA C200-80 PARAGRAPHS 13.10 TABLES 5-16 AND 13-7 AND FIG. 13-17)
11. 6" FUSION BONDED EPOXY LINED AND COATED CLAYTON NO. 925-01 PRESSURE REDUCING VALVE SET TO OPEN AT 65 PSI AND UPSTREAM SUSTAINING MINIMUM 125 PSI FLANGES - 2 REQ
12. 6" TUBERINE TYPE WATER METER (ROCKWELL MODEL W-2000DR WITHOUT STRAINER) - 1 REQ
13. 6" INSULATING FLANGE GASKET
14. 4" FUSION BONDED EPOXY LINED AND COATED FLANGED (OS&F) RESILIENT WEDGE GATE VALVE - 2REQ
15. 4" FUSION BONDED EPOXY LINED AND COATED LONG RADUS WELDED STEEL ELBOW - 2 REQ
16. 4" FUSION BONDED EPOXY LINED AND COATED FLANGED WELDED STEEL PIPE - 2 REQ
17. 4" FUSION BONDED EPOXY LINED AND COATED PRESSURE REDUCING VALVE (CLAYTON VALVE #910-01) SET AT 75 PSI
18. 4" FUSION BONDED EPOXY LINED AND COATED COUPLING ADAPTER - 1 REQ. (ALL FLANGED COUPLING ADAPTERS SHALL BE RESTRAINED IN ACCORDANCE TO AWWA C200-80 PARAGRAPHS 13.10 TABLES 5-16 AND 13-7 AND FIG. 13-17)
19. 4" FUSION BONDED EPOXY LINED AND COATED BY FLAIN END WELDED STEEL PIPE - 1 REQ
20. 4"x4"x4" FUSION BONDED EPOXY LINED AND COATED WELDED STEEL TEE - 1 REQ
21. 4" FUSION BONDED EPOXY LINED AND COATED FLANGED WELDED STEEL RISER PIPE
22. 4" FUSION BONDED EPOXY LINED AND COATED RELIEF VALVE (CLAYTON MODEL 50-A-01 FLANGED ENDS WITH ANGLE PATTERN (SET AT 80 PSI) - 1 REQ
23. 4" FLANGED BY PLAIN END PVC PIPE SCH 80
24. 4" 45° SCH 80 PVC ELBOW
25. 3" STEEL RISER PIPE CUT TO SUIT WELDED TO COMPANION FLANGE - 4 REQ
26. 4" COMPANION FLANGE - 4 REQ
27. 6" ADJUSTABLE PIPE SADDLE SUPPORT ASSY GRINNEL FIG. 264 OR EQUAL - 3 REQ
28. 4" ADJUSTABLE PIPE SADDLE SUPPORT ASSY GRINNEL FIG. 264 OR EQUAL - 1 REQ
29. 12" X 8" CORN PA SERIES PIPE CONCRETE PRE-CAST FRAME AND COVER WITH MATCHING GALVANIZED STEEL



NOTE:
ALL PIPING AND PIPE FITTINGS WITHIN THE VALVE PIT SHALL BE COATED WITH 4 MILS DFT OF SAFETY BLUE POLYAMIDE EPOXY (ANSI 253.1-1970). FUSION BONDED EPOXY LINING AND COATING OF VALVES, REGULATORS, FLOW METERS, COUPLINGS AND PIPES SHALL BE A MINIMUM THICKNESS OF 12 MILS DFT. FOR SHIPMENT, THE ENTIRE SYSTEM SHALL BE SHOP ASSEMBLED FOR FIT.

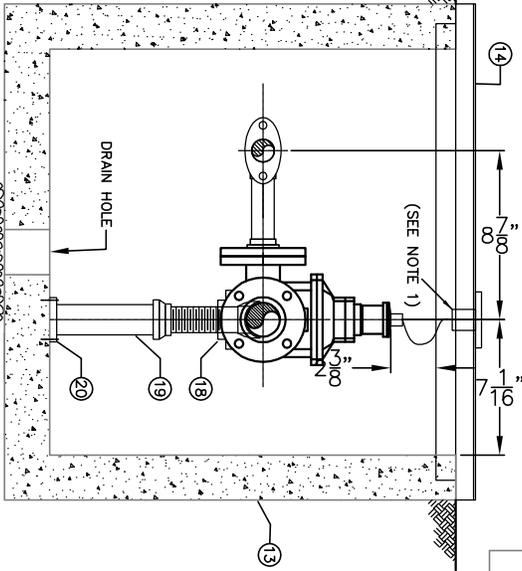
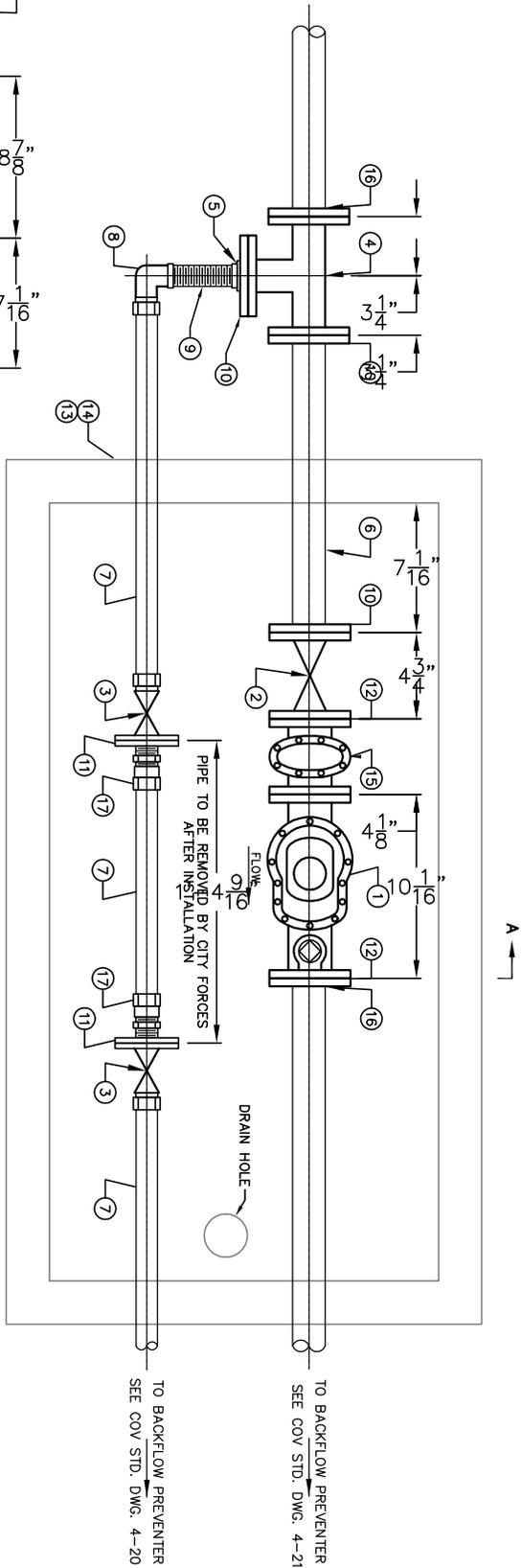


CITY OF VALLEJO STANDARD DETAIL
STANDARD 6" PRESSURE REDUCING STATION

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-16
SCALE:
NONE
DATE:
9/13/11



- MATERIAL LIST**
1. COMPOUND METER, 3", SENSUS MODEL, SRH
 2. GATE VALVE, 3", 150 LB. FLANGED, AWMA NON RISING STEMS
 3. MULLER LOCKING BALL VALVE 2", B24335, w/COMPRESSION COUPLING AND METER FLANGE
 4. TEE, 3"x3"x3", DIP
 5. 3"x2" PVC BUSHING
 6. PIPE, 3" DIA., DIP, 2'-3"x4"
 7. PIPE, 2" DIA., TYPE "K", COPPER, 9'+
 8. 90° BEND FIP x COMP FITTING, 2" DIA.
 9. CLOSE NIPPLE, 2" DIA., BRASS
 10. THREADED FLANGE, 3" AWMA CLASS D, 150 LB. DRILLING
 11. METER FLANGE, FEMALE FIP, 2" BRASS
 12. INSULATING GASKET SET, 1" 3" x 3" w/ DRAIN HOLE
 13. CONCRETE VAULT, 6' x 3' x 3'D, w/ DRAIN HOLE
 14. PARKWAY LID, ALUMINUM DIAMOND PLATE, w/WATER REPEL SLIP RESISTANT COATING
 15. WATER METER STRAINER, 3"
 16. 3" FLANGE AND PLAIN END DIP
 17. STRAIGHT COUPLING NIP x COMPRESSION, 2 REQ.
 18. 3" ADJUSTABLE PIPE SADDLE SUPPORT ASSY, GRINELL FIB 564, OR EQUIV., 2 REQ.
 19. 3" STEEL RISER PIPE CUT TO SUIT, WELDED TO COMPANION FLANGE, 2 REQ.
 20. COMPANION FLANGE FOR RISER PIPE AND ATTACH w/STAINLESS STEEL EXPANSION ANCHOR BOLTS, 2 REQ.

- NOTES:**
1. CENTER THE METER READING HOLE OVER THE METER REGISTER.
 2. SET METER SO THAT REGISTER IS 4" BELOW LID WHEN THE NUT OPERATOR ON GATE VALVE DOES NOT INTERFERE.
 3. TAPE-WRAP ALL BURED, COPPER PIPING, WITH 1/2 LAP TAPE.
 4. HOT DIP GALVANIZE PIPE SUPPORTS, AFTER FABRICATION.
 5. IN WET FIELD CONDITIONS, INSTALL WATER TIGHT CONCRETE PLUG IN DRAIN HOLE.

SECTION A-A
3/4" DRAIN ROCK, 8 FT³ MIN
FOR DRY FIELD CONDITION ONLY
(SEE NOTE 5 FOR WET FIELD CONDITION)



CITY OF VALLEJO STANDARD DETAIL

**STANDARD 3" COMPOUND METER
INSTALLATION WITH 2" BYPASS**

APPROVED BY:

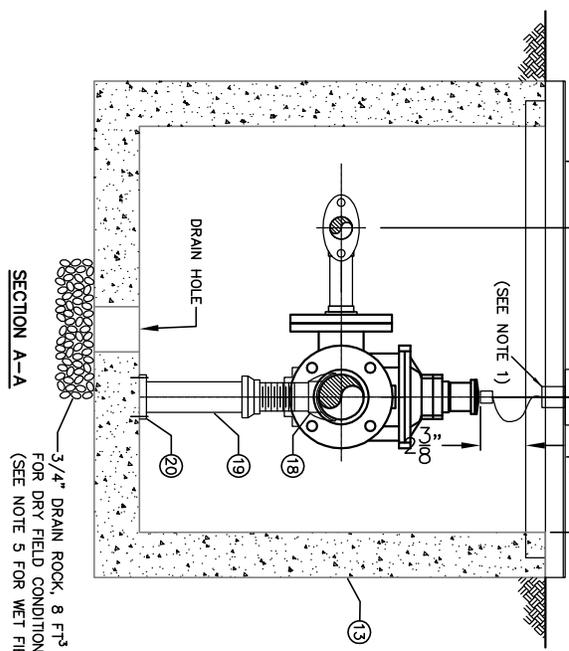
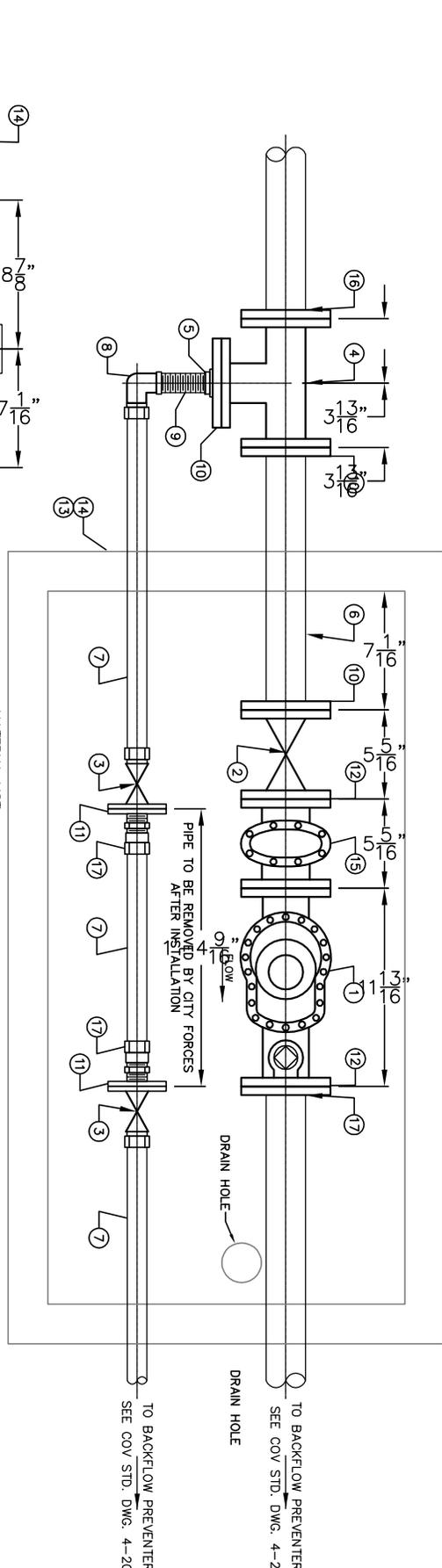


DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-17

SCALE:
NONE

DATE:
9/13/11



MATERIAL LIST

1. COMPOUND METER, 4", SENSUS MODEL SRH
2. GATE VALVE, 4", 150 LB. FLANGED.
3. AWMA NON RISING STEMS
4. MUELLER LOCKING BALL VALVE 2", B24335, W/COMPRESSION COUPLING AND METER FLANGE
5. 3"x2" PVC BUSHING
6. PIPE, 4" DIA., DIP, 2'-3"±
7. PIPE, 2" DIA., TYPE "K", COPPER, 9'±
8. 90° BEND FIP x COMP FITTING, 2" DIA.
9. CLOSE NIPPLE, 2" DIA., BRASS
10. THREADED FLANGE, 4" AWMA CLASS D, 150 LB. DRILLING
11. METER FLANGE, GASKET SET, 4", F. BRASS, 2 REQ.
12. INSULATING GASKET SET, 4", F. BRASS, 2 REQ.
13. CONCRETE VAULT, 6'L x 3'W x 3'D, W/RAIN HOLE
14. PARKWAY LID, ALUMINUM DIAMOND PLATE, W/WATER REPEL SLIP RESISTANT COATING
15. WATER METER STRAINER 4"
16. FLANGE AND PLAIN END DIP
17. STRAP AND PIPE END COMPRESSOR, 2 REQ.
18. 3" ADJUSTABLE PIPE SADDLE SUPPORT ASSY, GROUND FILE #4 D, EOUA, 2 REQ.
19. 3" STEEL RISER PIPE CUT TO SUIT WELDED TO COMPANION FLANGE 2 REQ.
20. COMPANION FLANGE FOR RISER PIPE, AND ATTACH W/STAINLESS STEEL EXPANSION ANCHOR BOLTS, 2 REQ.

PLAN

A ←

NOTES:

1. CENTER THE METER READING HOLE OVER THE METER REGISTER.
2. SET METER SO THAT REGISTER IS 4" BELOW LID WHEN THE NUT OPERATOR ON GATE VALVE DOES NOT INTERFERE.
3. TAPE-WRAP ALL BURIED, COPPER PIPING, WITH 1/2 LAP TAPE.
4. HOT DIP GALVANIZE PIPE SUPPORTS, AFTER FABRICATION.
5. IN WET FIELD CONDITIONS INSTALL WATER TIGHT CONCRETE PLUG IN DRAIN HOLE.

SECTION A-A

FOR DRY FIELD CONDITION ONLY
(SEE NOTE 5 FOR WET FIELD CONDITION)

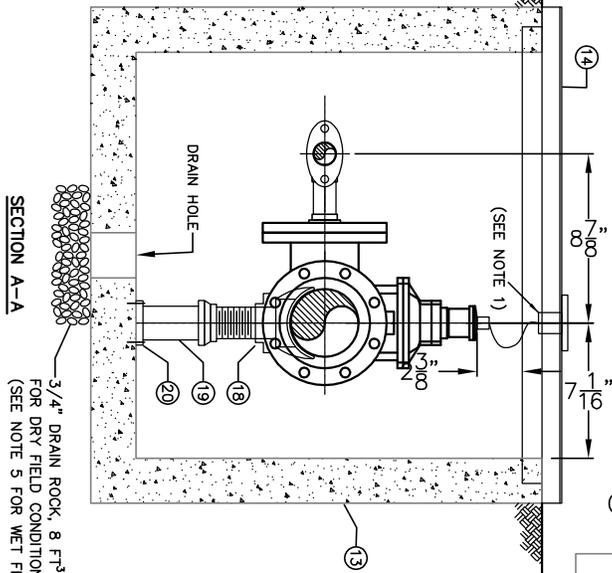
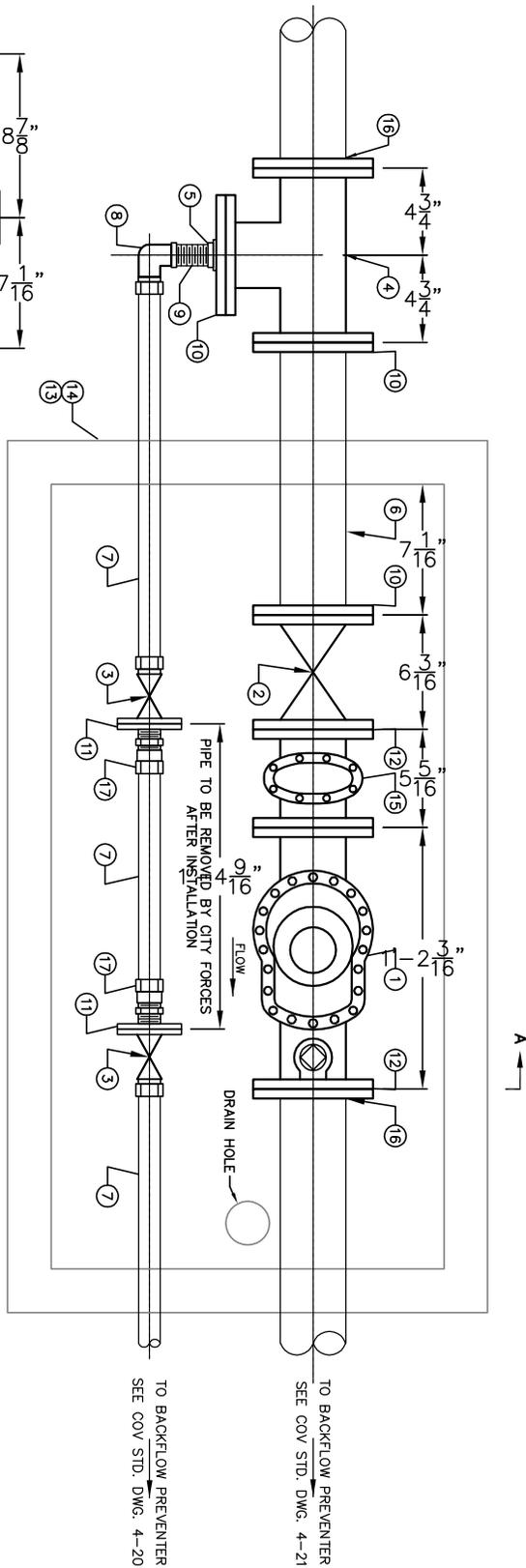


CITY OF VALLEJO STANDARD DETAIL
STANDARD 4" COMPOUND METER
INSTALLATION WITH 2" BYPASS

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-18
SCALE:
NONE
DATE:
9/13/11



SECTION A-A

3/4" DRAIN ROCK, 8 FT³ MIN
FOR DRY FIELD CONDITION ONLY
(SEE NOTE 5 FOR WET FIELD CONDITION)

MATERIAL LIST

1. COMPOUND METER, 6", SENSUS MODEL, SRH
2. GATE VALVE, 6", 150 LB. FLANGED, AWMA NON RISING STEMS
3. MUELLER LOOKING BALL VALVE 2", B24335, w/COMPRESSION COUPLING AND METER FLANGE
4. TEE, 6"x6"x6", DIP
5. 3"x2" PVC BUSHING
6. PIPE, 6" DIA., DIP, 2'-3"±
7. PIPE, 2" DIA., TYPE "K" COPPER, 9'±
8. 90° BEND FIP x COMP FITTING, 2" DIA.
9. CLOSE NIPPLE, 2" DIA., BRASS
10. THREADED FLANGE, 6" AWMA CLASS D, 150 LB. DRILLING
11. METER FLANGE, FEMALE FIP 2", BRASS, 2 REQ.
12. INSULATING GASKET SET, 6", FLANGED, 2 REQ.
13. CONCRETE VAULT, 6L x 3W x 3D, w/ DRAIN HOLE
14. PARKWAY LID, ALUMINUM DIAMOND PLATE, w/WATER REPEL, SLIP RESISTANT COATING
15. WATER METER, 3" RANKER, 6" DIP
16. 3" STRAIGHT COUPLING NIP
17. 3" ADJUSTABLE PIPE SADDLE SUPPORT ASSY, GRINELL FIG. 264, DR EQUAL, 2 REQ.
18. 3" STEEL RISER PIPE CUT TO SUIT WELDED TO COMPANION FLANGE, 2 REQ.
19. 3" COMPANION FLANGE FOR RISER PIPE, AND ATTACH w/STAINLESS STEEL EXPANSION ANCHOR BOLTS, 2 REQ.

PLAN

NOTES:

1. CENTER THE METER READING HOLE OVER THE METER REGISTER.
2. SET METER SO THAT REGISTER IS 4" BELOW LID WHEN THE NUT OPERATOR ON GATE VALVE DOES NOT INTERFERE.
3. TAPE-WRAP ALL BURIED, COPPER PIPING, WITH 1/2 LAP TAPE.
4. HOT DIP GALVANIZE PIPE SUPPORTS, AFTER FABRICATION.
5. IN WET FIELD CONDITIONS INSTALL WATER TIGHT CONCRETE PLUG IN DRAIN HOLE.



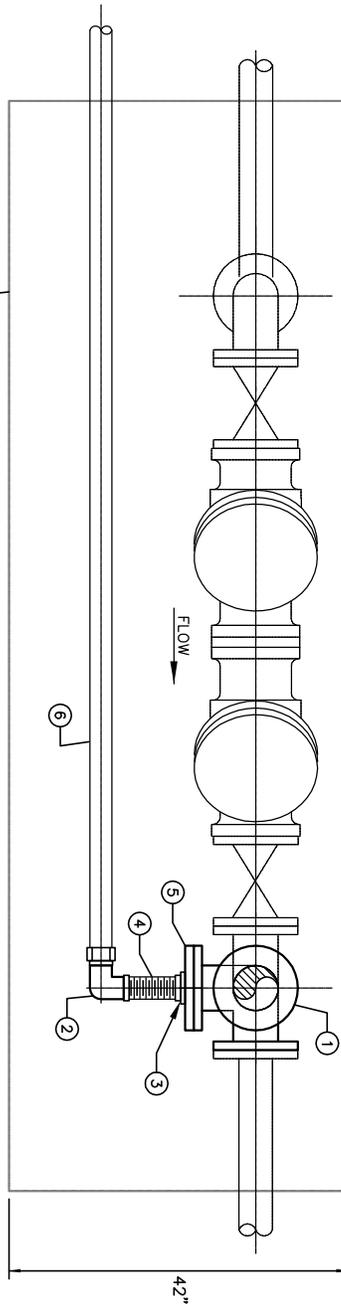
CITY OF VALLEJO STANDARD DETAIL

STANDARD 6" COMPOUND METER INSTALLATION WITH 2" BYPASS

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

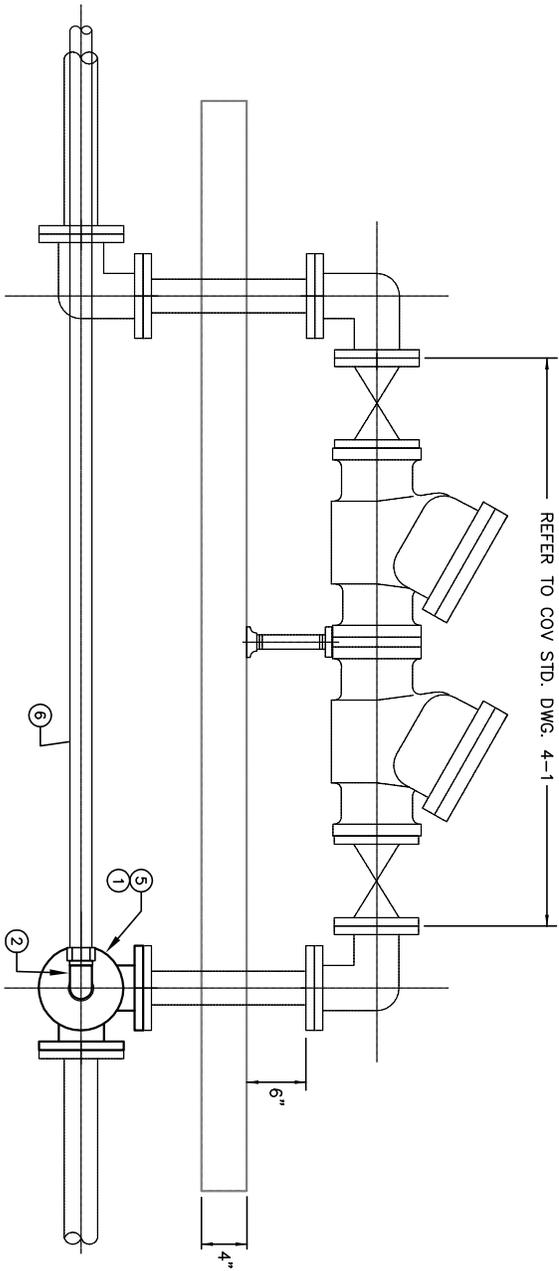
DRAWING NO:	4-19
SCALE:	NONE
DATE:	9/13/11



CONCRETE PAD (SEE COV STD. DWG. 4-23 FOR DETAILS)

PLAN

REFER TO COV STD. DWG. 4-1



ELEVATION

MATERIAL LIST

1. SIDE OUTLET 90° ELBOW, DIP
2. 90° BEND FIP x COMP. FITTING, 2" DIA.
3. 3"x2" PVC BUSHING
4. CLOSE NIPPLE, 2" DIA., BRASS
5. BLIND FLANGE, TAPPED
6. PIPE, 2" DIA., COPPER, 6'±

NOTES

1. TAPE WRAP ALL BURIED COPPER PIPING, WITH 1/2-LAP TAPE



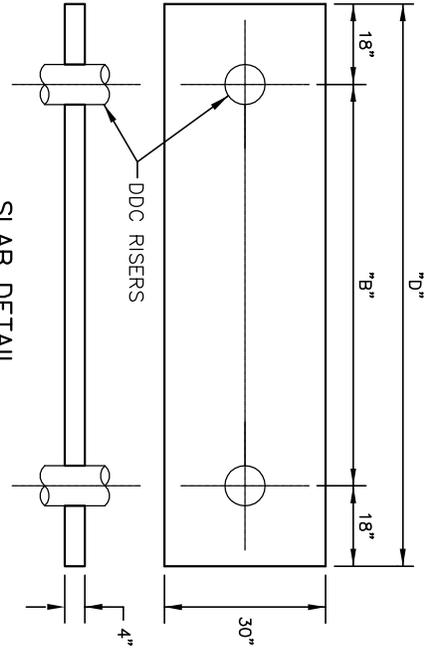
CITY OF VALLEJO STANDARD DETAIL

**STANDARD 2" BYPASS FOR
INSTALLATION WITH 3", 4", & 6"
COMPOUND METERS**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO: 4-20
SCALE: NONE
DATE: 9/13/11



CONCRETE PAD BY OWNER OR CONTRACTOR

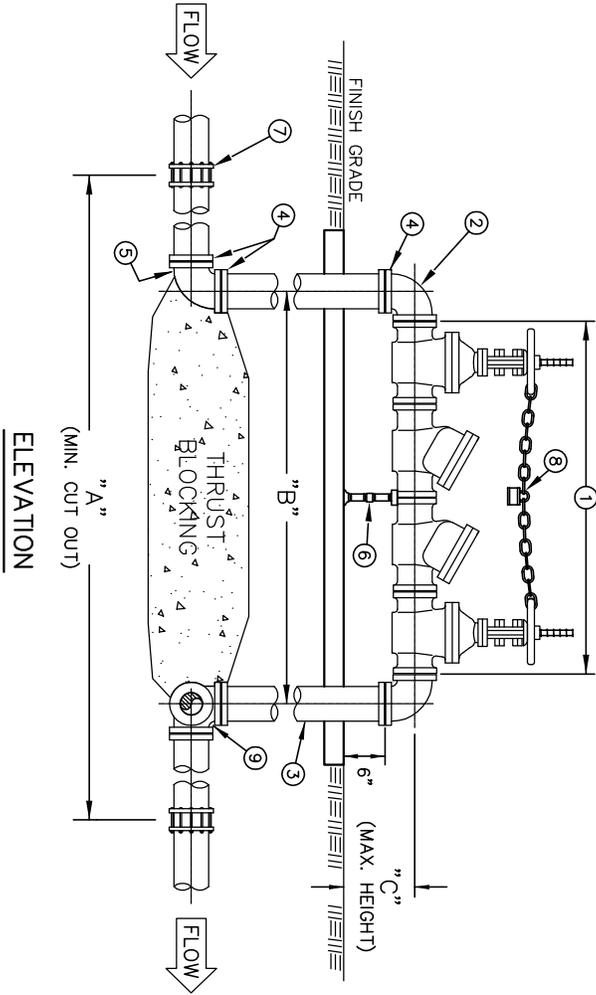
SLAB DETAIL

DIMENSIONS				
NOM. DIA.	A	B	C	D
	MIN. CUT OUT		MAX. HEIGHT	
3"	6'-2"	4'- 7/16"	11 1/2"	7'- 7/16"
4"	7'-6"	5'-3 7/16"	12 1/2"	8'-3 7/16"
6"	8'-7"	6'-3 11/16"	14"	9'-3 11/16"

MATERIALS LIST	
No. QTY.	DESCRIPTION
① 1	DOUBLE-DETECTOR CHECK VALVE ASSY.
② 2	90° ELBOW, FLANGE x M.J.
③ 2	± 5 FT. EACH, DUCTILE IRON PIPE
④ 6	M.J. RESTRAINING GLANDS
⑤ 2	90° ELBOW, M.J. x M.J.
⑥ 1	PIPE SUPPORT
⑦ 2	STD. FLEX. COUPLINGS OR M.J. SLEEVES
⑧ 1	CHAIN AND LOCK, AS REQUIRED
⑨ 1	SIDEOUTLET ELBOW, AS REQUIRED

NOTES

1. DIMENSIONS FROM "FERCO MODEL 806". ANY CHANGES IN DIMENSIONS ARE BECAUSE OF MANUFACTURER CHANGE.
2. BACKFLOW DEVICE SHALL BE PROVIDED AND INSTALLED BY THE CITY.
3. UNLESS OTHERWISE DIRECTED, THE BACKFLOW DEVICE SHALL BE PERPENDICULAR TO THE STREET, AT THE BACK OF THE SIDEWALK.
4. HYDROSTATIC TESTING IS THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE COMPLETED AND APPROVED BY THE CITY INSPECTOR, BEFORE THE BACKFLOW DEVICE IS INSTALLED.
5. THRUST RESTRAINT DURING HYDROSTATIC TESTING, IS THE RESPONSIBILITY OF THE CONTRACTOR. ANY TEMPORARY RESTRAINT, SHALL BE REMOVED AS DIRECTED.
6. WHEN THE CITY HAS INSTALLED THE DEVICE, THE CITY WILL CHAIN THE SHUT-OFF VALVE, AS FOLLOWS: STREET VALVE "OPEN", AND THE PROPERTY VALVE "CLOSED", UNLESS OTHERWISE DIRECTED BY CITY INSPECTOR.
7. UNLESS OTHERWISE DIRECTED, ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON.



ELEVATION

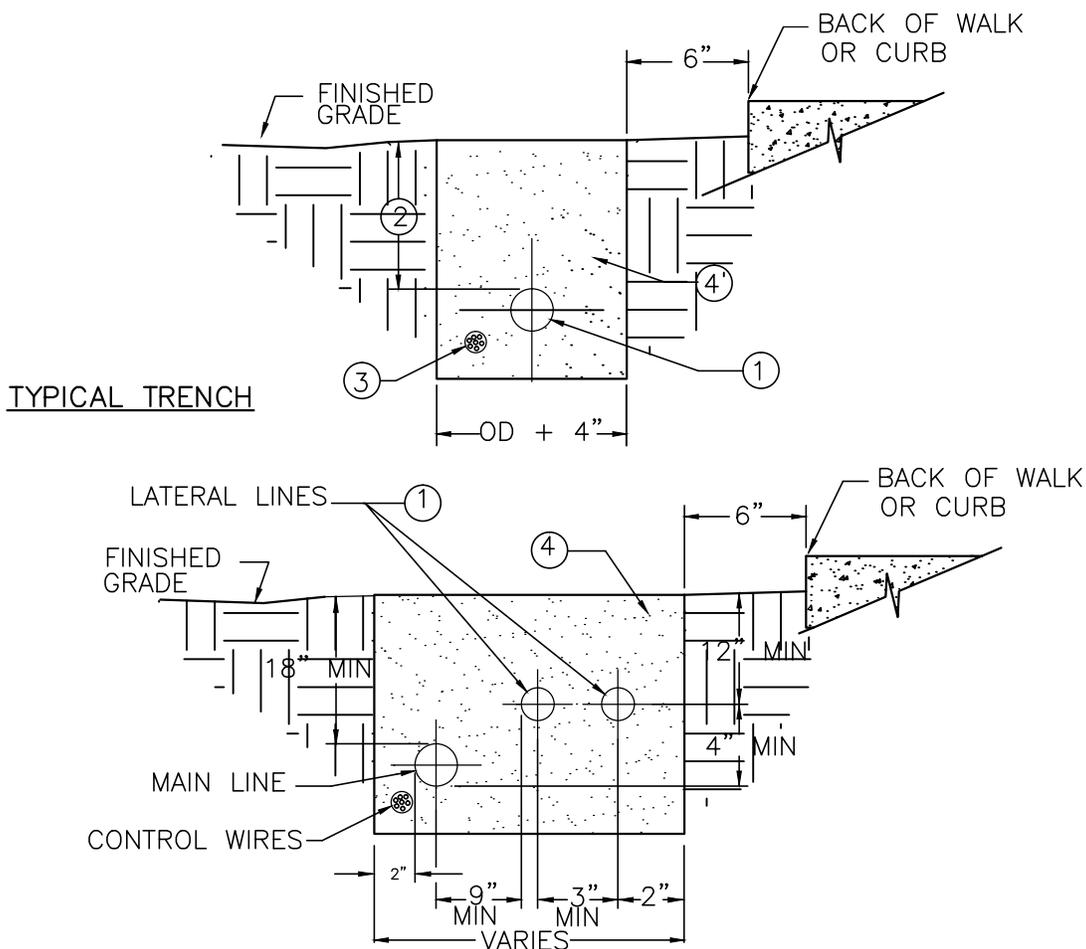


CITY OF VALLEJO STANDARD DETAIL
STANDARD BACKFLOW PREVENTER
FOR INSTALLATION WITH
3", 4", & 6" COMPOUND METERS

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
4-21
 SCALE:
 NONE
 DATE:
9/13/11



DETAIL NOTES:

1. SCHEDULE 40 PIPE
2. 18" MIN FOR MAIN LINE, 12" MIN FOR LATERAL LINE.
3. BUNDLE CONTROL WIRE ALONGSIDE MAIN LINE (TYP). TAPED AT TEN FEET INTERVALS, LOOP WIRE BUNDLE AT ALL SHARP TURNS GREATER THAN 45°. REFER TO SEC. 5.2.4.(5d) FOR WIRE SCHEDULE
4. IF THE EXCAVATED NATIVE MATERIAL IS LARGER THAN 3/4" DIA, IT SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO PROVIDE SUITABLE BACKFILL MATERIAL. SUITABILITY OF THE BACKFILL SHALL BE DETERMINED AT THE CITY'S DISCRETION. THE REPLACEMENT BACKFILL SHALL HAVE 85% RELATIVE COMPACTION. NATIVE MATERIAL THAT IS USED AS BACKFILL SHALL BE CLEAR OF ALL DEBRIS AND ROCKS LARGER THAN 3/4" IN DIAMETER.

GENERAL NOTES:

PROVIDE 24" SEPARATION BETWEEN IRRIGATION LINES AND VARIOUS UTILITIES.

ROUTE TRENCH 6 FEET MIN AWAY FROM ANY TREE PLANTING AND OUTSIDE THE DRIP-LINE OF EXISTING TREES, UNLESS AUTHORIZED PRIOR TO CONSTRUCTION.

EXCAVATION FOR IRRIGATION SLEEVES UNDER PAVED IMPROVEMENTS SHALL BE DONE AS PER THE "TYPICAL TRENCH BACKFILL STANDARD DETAIL".

UNLESS AUTHORIZED PRIOR TO CONSTRUCTION.



CITY OF VALLEJO STANDARD DETAIL

**IRRIGATION LINE
TRENCHING DETAILS**

APPROVED BY:

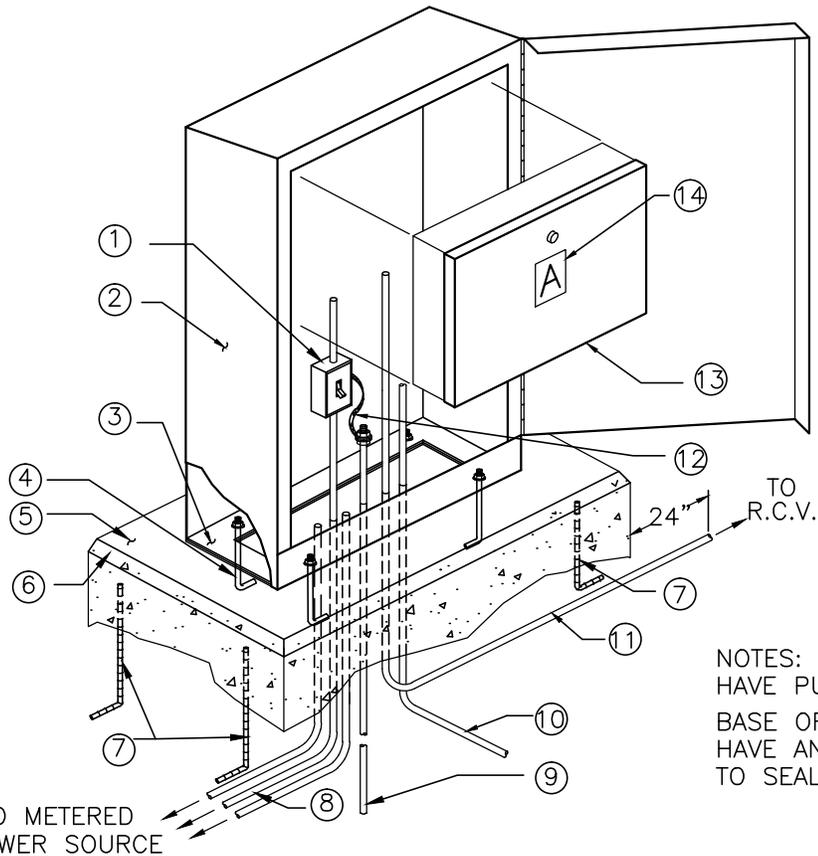
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-01

SCALE:
NONE

DATE:
7/1/15



NOTES: ALL CONDUITS SHALL HAVE PUTTY IN THEM.
 BASE OF CONTROLLER SHALL HAVE AN EVEN SILICONE BEAD TO SEAL

1. 120V SPST 20 AMP SHUT OFF WITH J-BOX PLUS CFI OUTLET
2. CABINET – SHERWOOD GREEN
3. INSTALL A 1/4" STEEL BASE PLATE TO MATCH PEDESTAL BETWEEN WASHER AND PEDESTAL FLANGE. BASE PLATE SHALL BE PAINTED
4. 3/8" DIA. x 6" LENGTH J- BOLT
5. 36"Wx36"Lx12"D CLASS "B" PCC FOOTING
6. TAPER ALL EDGES
7. 1/2" DIA. REBAR BURIED 24" BELOW BOTTOM OF SLAB (4 PLACES)
8. UTILITY CLASS 3/4" DIA. SCH.40, PVC CONDUIT FOR 120V WIRING, SHALL HAVE A MINIMUM OF 24" COVER. INSTALL TWO (2) ADDITIONAL SWEEPS.
9. 8' L x 3/4" DIA. COPPER COATED GROUND ROD
10. 1-1/2" DIA. SCH.40, PHONE LINE CONDUIT WITH PULL BOXES AND PULL ROPE, SHALL HAVE A MINIMUM COVER OF 24"
11. COLOR CODED (5.2.4.5d) 24V WIRES IN SCH. 40 PVC CONDUIT, SHALL HAVE A MINIMUM OF 18" COVER.
12. GROUND JUMPER TO SWITCH
13. CONTROLLER – SHALL BE RAINMASTER EVOLUTION WITH VIT ENCLOSURE
14. AFFIX CONTROLLER LETTER TO OUTSIDE OF THE BOX USING A SELF STICKING REFLECTIVE OR BOLT ON PLATE



CITY OF VALLEJO STANDARD DETAIL
IRRIGATION CONTROLLER MOUNTING DETAIL

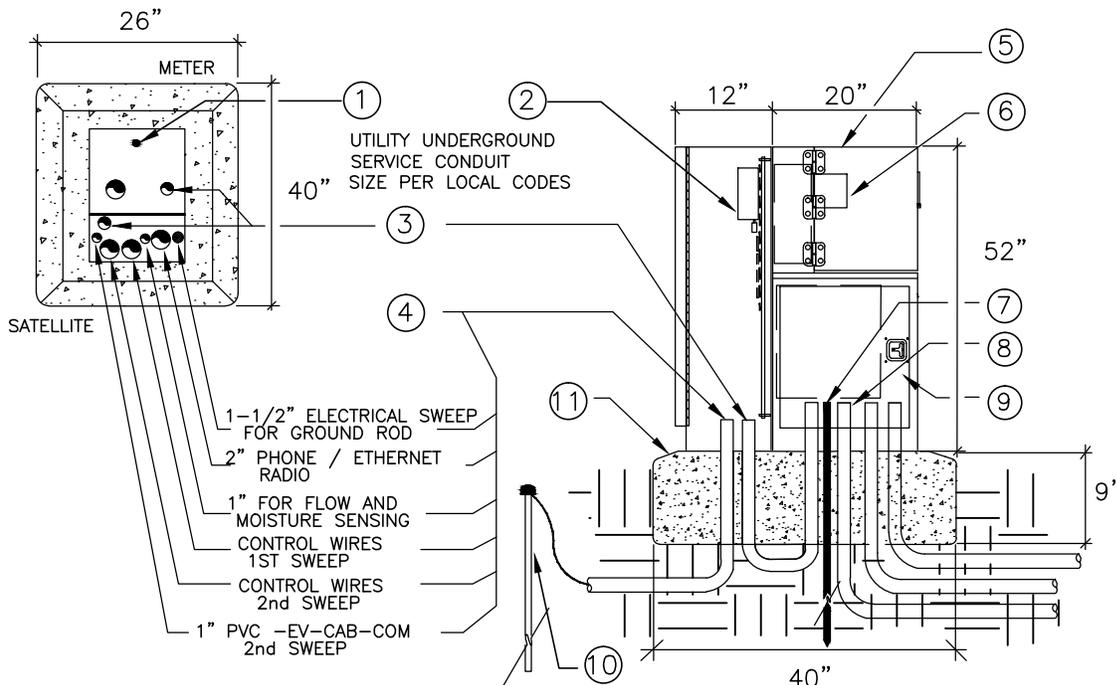
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-02

SCALE:
 NONE

DATE:
 7/1/15



1. METER GROUND ROD TO COMPLY TO LOCAL CODE
2. SATELLITE
3. PVC CONDUIT FOR 120 VAC FROM METERED POWER SUPPLY PER LOCAL CODE
4. PVC CONDUIT – SIZE AS REQUIRED
5. UNITED GREEN TECH METER ASSEMBLY NEMA 3R RAINPROOF ENCLOSURE (UL LISTED)
6. METER
7. METER GROUND ROD TO COMPLY TO LOCAL CODE
8. UTILITY UNDERGROUND SERVICE CONDUIT SIZE PER LOCAL CODE. INSTALL TWO (2) EXTRA SWEEPS
9. PVC CONDUIT FOR CONTROL WIRES 2nd SWEEP SIZE AS REQUIRED HAVE A MINIMUM COVER OF 24"
10. SATELLITE GROUNDING. UL LISTED 5/8" DIA X 8' GROUND ROD IN A 10" ROUND VALVE BOX WITH #6 BONDING WIRE AND CADWELL OR CLAMP CONNECTOR
11. CONCRETE PAD

NOTES

ALL CABLES AND ELECTRICAL WIRES MUST BE RUN IN CONDUIT.

SA ASSEMBLE TO INCLUDE:

CONTROLLER MODEL AS SPECIFIED, ENCLOSURE MODEL AS SPECIFIED, OPTIONS AS SPECIFIED
 TERMINAL STRIPS, TEMPLATE 4 BOLTS, UL LISTED 8' COPPER GROUND ROD, GROUND CLAMP
 OR CADWELD, 10' OF #6 GROUNDING WIRE.

SATELLITE GROUNDING: GROUND ROD SHALL BE LOCATED NO CLOSER THAN 8' AND NO
 FURTHER THAN 12' FROM THE CONTROLLER UNLESS OTHERWISE SPECIFIED.

A 10" ROUND VALVE BOX SHALL BE INSTALLED OVER THE GROUND ROD FOR LOCATION



CITY OF VALLEJO STANDARD DETAIL

**SATELLITE ASSEMBLY
 WITH METER DETAIL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

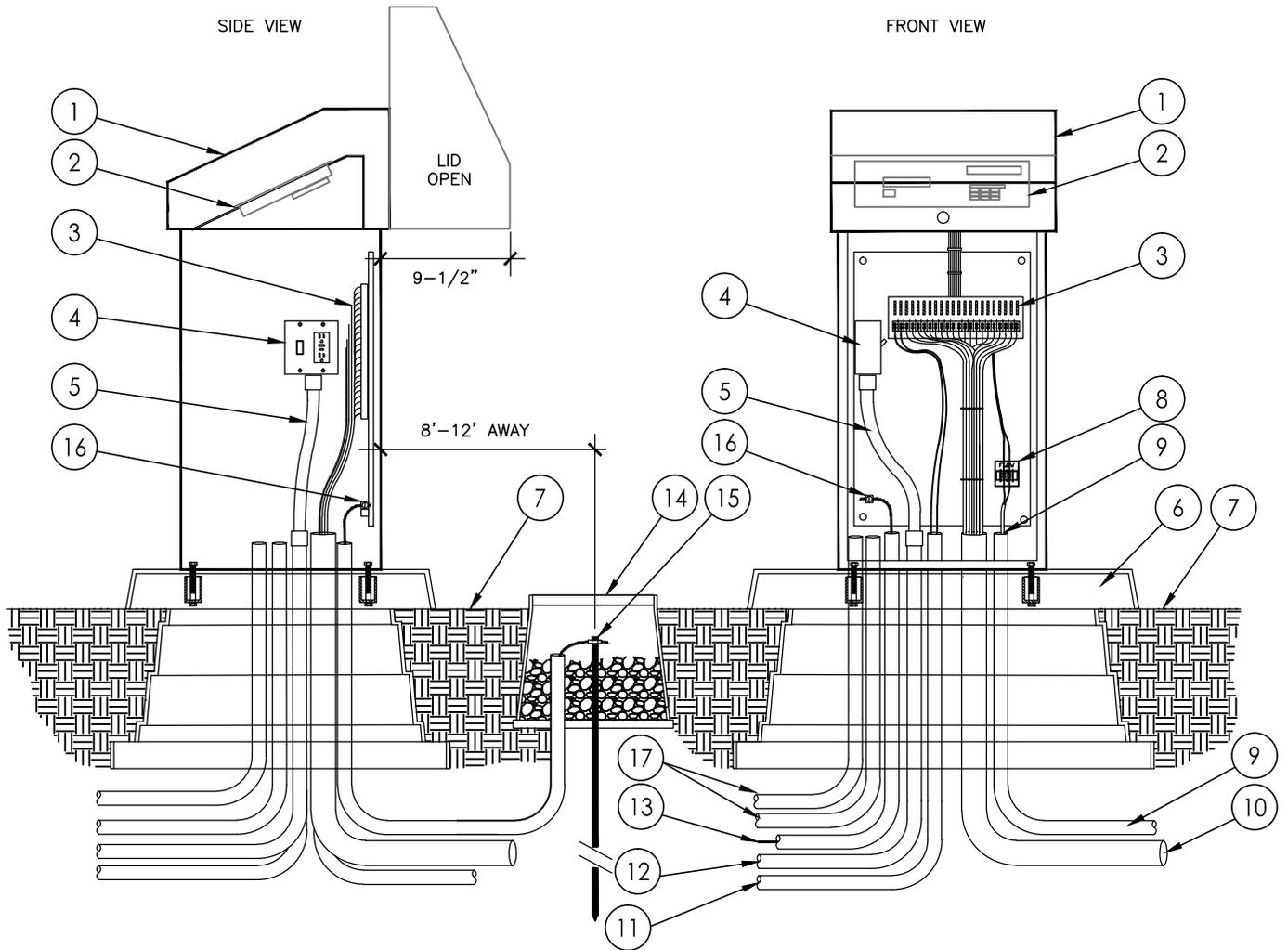
5-03

SCALE:

NONE

DATE:

7/1/15



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. STRONGBOX STAINLESS STEEL NEMA 3R RAINPROOF ENCLOSURE (UL LISTED). 2. SATELLITE ASSEMBLY. ASSEMBLED IN ENCLOSURE BY JOHN DEERE GREEN TECH. 3. TERMINAL STRIP FOR VALVE WIRES. 4. POWER SWITCH / GFCI RECEPTACLE. 5. ELECTRICAL FLEX CONDUIT FOR POWER. 6. EMP-16, STRONGBOX QUICK-PAD. FILL WITH 3/4" CRUSHED ROCK. 7. FINISHED GRADE. 8. FLOW SENSOR TERMINAL BOARD. 9. 1" CONDUIT AND SWEEP ELL WITH FLOW SENSOR CABLE. | <ol style="list-style-type: none"> 10. 3" CONDUIT AND SWEEP ELL FOR LEAD WIRES. 11. 1" CONDUIT AND SWEEP ELL FOR MASTER VALVE WIRES. 12. 1" CONDUIT AND SWEEP ELL FOR 110 VAC POWER LINE. 13. 1" CONDUIT AND SWEEP ELL FOR GROUND WIRE. 14. 10" ROUND VALVE BOX AROUND GROUND ROD. FILL WITH 3/4" CRUSHED ROCK. 15. 5/8" X 8' GROUND ROD WITH #6 GROUND WIRE AND CLAMP. LOCATE 8'-12' FROM ENCLOSURE. 16. #6 GROUND WIRE SECURED TO BACKBOARD GROUNDING TERMINAL. 17. INSTALL TWO (2) EXTRA SWEEPS. |
|--|---|

NOTE: SEE IRRIGATION LEGEND CALL OUT FOR INCLUDED SATELLITE COMMUNICATION COMPONENTS. SUGGESTED CONDUIT SIZES MAY NEED TO BE LARGER.



CITY OF VALLEJO STANDARD DETAIL

**SATELLITE ASSEMBLY
WITHOUT METER DETAIL**

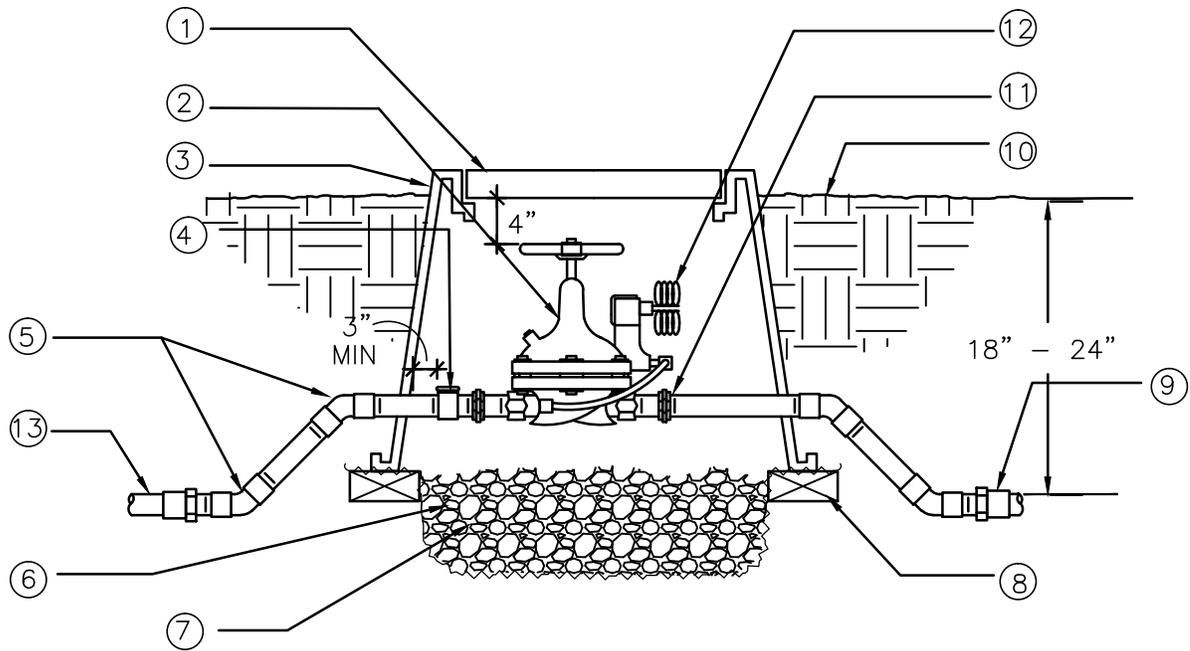
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-04

SCALE:
NONE

DATE:
7/1/15



1. RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID, ONE VALVE PER BOX
2. MASTER CONTROL VALVE WITH FLOW CONTROL AND MANUAL BLEED
3. SET BOX 2" ABOVE GRADE
4. THREADED BRONZE BALL VALVE IN 1-1/2" AND SMALLER ASSEMBLIES, THREADED BRONZE GATE VALVE IN 2" OR LARGER ASSEMBLIES.
5. SCHEDULE 80 PVC NIPPLES (TBE) AND 45° THREADED ELBOWS TYPICAL BOTH SIDES OF VALVE.
6. INSTALL LANDSCAPE FILTER FABRIC UNDER GRAVEL
7. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE
IN STREETSCAPES, INSTALL WELDED WIRE MESH BELOW VALVE BOX IN ACCORDANCE WITH CALTRANS STANDARDS.
8. BRICK - 1 AT EACH CORNER OF VALVE BOX
9. SCHEDULE 80 MALE ADAPTER (2 TOTAL)
10. FINISH GRADE
11. SCHEDULE 80 PVC THREADED UNION (2 TOTAL)
12. VALVE CONTROL WIRE - PROVIDE 3M-DBY SEAL PACKS AT ALL SPLICES AND 36" OF EXCESS UF WIRE I A 1" DIAMETER COIL
13. SCHEDULE 40 MAINLINE



CITY OF VALLEJO STANDARD DETAIL

MASTER VALVE DETAIL

APPROVED BY:

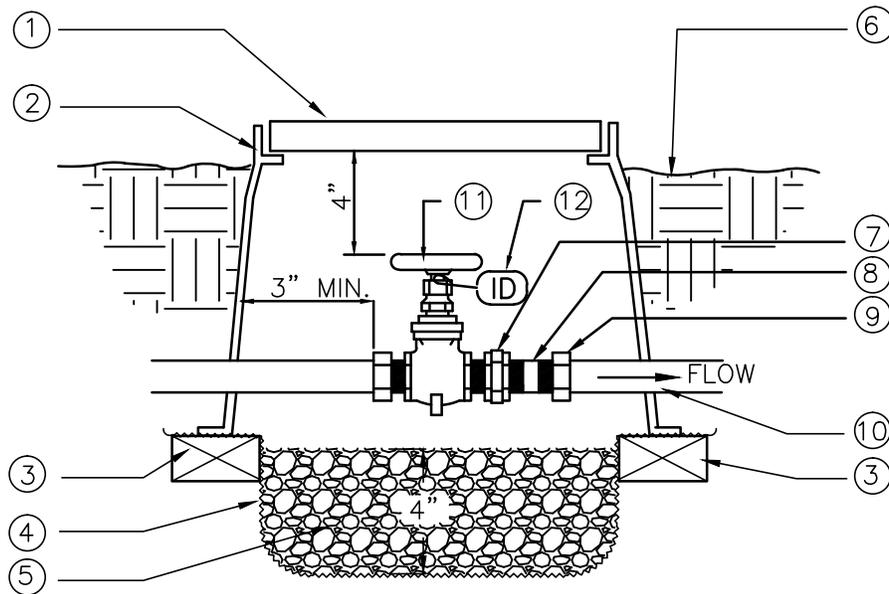
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-05

SCALE:
NONE

DATE:
7/1/15



1. TYPICAL ROUND VALVE BOX . ENGRAVE GATE VALVE AND CONTROL NUMBER ON LID WITH 2" INDENTED LETTERS
2. SET BOX 2" ABOVE GRADE
3. BRICK TO SUPPORT VALVE BOX
4. INSTALL LANDSCAPE FILTER FABRIC UNDER GRAVEL
5. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE
6. FINISH GRADE
7. BRASS UNION
8. BRASS NIPPLE (TYP)
9. PVC MALE ADAPTER
10. PVC SCH. 40 PIPE
11. GATE VALVE
12. INSTALL ID TAG



CITY OF VALLEJO STANDARD DETAIL

**3" OR SMALLER ISOLATION
/ GATE VALVE DETAIL**

APPROVED BY:

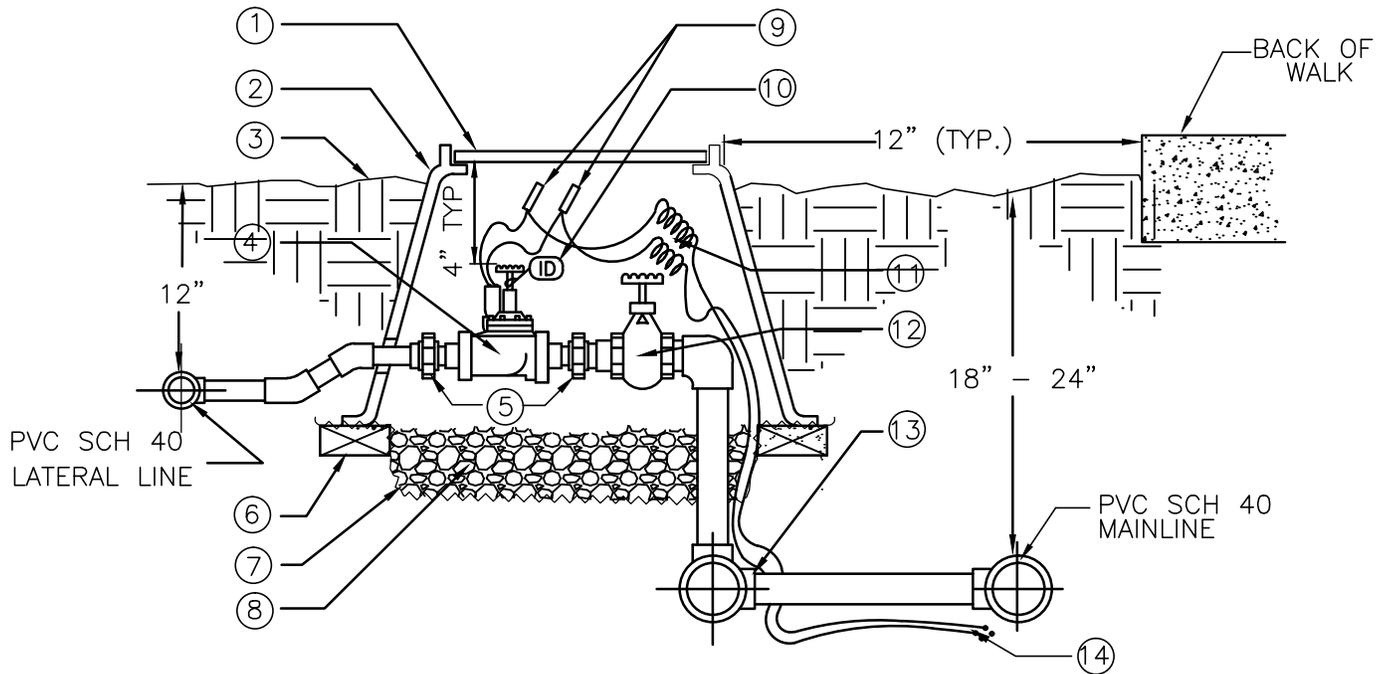
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-06

SCALE:
NONE

DATE:
7/1/15



1. TYPICAL RECTANGULAR VALVE BOX, ENGRAVE CONTROL NUMBER AND VALVE NUMBER ON LID WITH 2" INDENTED LETTERS
2. SET BOX 2" ABOVE GRADE
3. FINISHED GRADE
4. RAIN BIRD PEB SERIES REMOTE CONTROL VALVE. OR APPROVED EQUAL
5. UNION SCHEDULE 80 PVC.
6. BRICK - 1 AT EACH CORNER OF VALVE BOX
7. INSTALL LANDSCAPE FILTER FABRIC UNDER GRAVEL
8. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE
9. PROVIDE WATERPROOF LOW VOLTAGE CONNECTORS OVER COPPER CRIMPS ON ALL CONNECTIONS AND SEAL WITH WATERPROOF SEALANT.
10. INSTALL VALVE I.D. TAG
11. 36" PIGTAIL COIL OF WIRE.
12. BALL VALVE SIZED THE SAME AS VALVES UP TO 1-1/2" INSTALL BRONZE OR APPROVED PVC GATE VALVE FOR ASSEMBLIES 2" OR ABOVE.
13. APPROVED FOR TRIPLE SWING DOUBLE SWING JOINT ASSEMBLY.
14. CONTROL WIRES - NO SPLICE

NOTE: LOOP, COIL, AND SECURE 36" OF SPARE WIRE (NOT SHOWN) INSIDE EACH VALVE BOX.



CITY OF VALLEJO STANDARD DETAIL

**REMOTE CONTROL VALVE
ASSEMBLY DETAIL**

APPROVED BY:

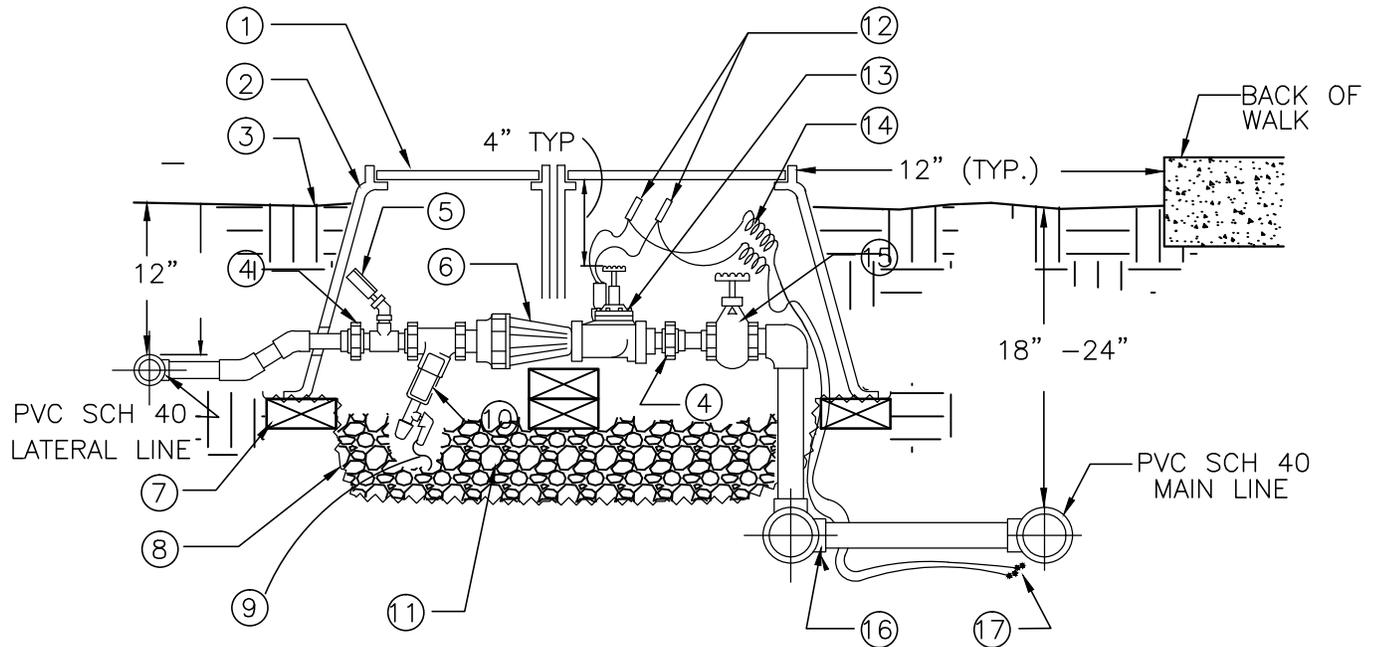
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-07

SCALE:
NONE

DATE:
7/1/15



1. TYPICAL RECTANGULAR VALVE BOX, ENGRAVE CONTROL NUMBER AND VALVE NUMBER ON LID WITH 2" INDENTED LETTERS
2. SET BOX 2" ABOVE FINISHED GRADE
3. FINISHED GRADE
4. UNION SCHEDULE 80 PVC.
5. PRESSURE GAUGE IF PRE-SET PRESSURE REDUCER NO GAUGE NEEDED
6. PRESSURE REGULATOR
7. BRICKS TYP - 1 AT EACH CORNER OF VALVE BOX
8. INSTALL LANDSCAPE FABRIC AROUND GRAVEL
9. PROVIDE SPACE TO REMOVE FILTER.
10. DRIP SYSTEM STRAINER W/CHANGABLE PACK FILTER, 140-200 MESH FILTER INSIDE. FILTER UNIT TO BE POSITIONED OFF TO ONE SIDE FOR CONVENIENCE OF ACCESS.
11. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE
12. PROVIDE WATERPROOF LOW VOLTAGE CONNECTORS OVER COPPER CRIMPS ON ALL CONNECTIONS AND SEAL WITH WATERPROOF SEALANT.
13. RAINBIRD PEB SERIES REMOTE CONTROL VALVE OR APPROVED EQUAL
14. 36" PIGTAIL COIL OF WIRE.
15. THREADED BALL VALVE WITH 1-1/2" OR SMALLER ASSEMBLIES, THREADED BRONZE GATE VALVE IN 2" OR LARGER ASSEMBLIES
16. TRIPLE SWING DOUBLE O-RING SWING JOINT ASSEMBLY.
17. CONTROL WIRES

NOTE: LOOP, COIL, AND SECURE 36" OF SPARE WIRE (NOT SHOWN) INSIDE EACH VALVE BOX.



CITY OF VALLEJO STANDARD DETAIL

**VALVE ASSEMBLY FOR
DRIP SYSTEM**

APPROVED BY:

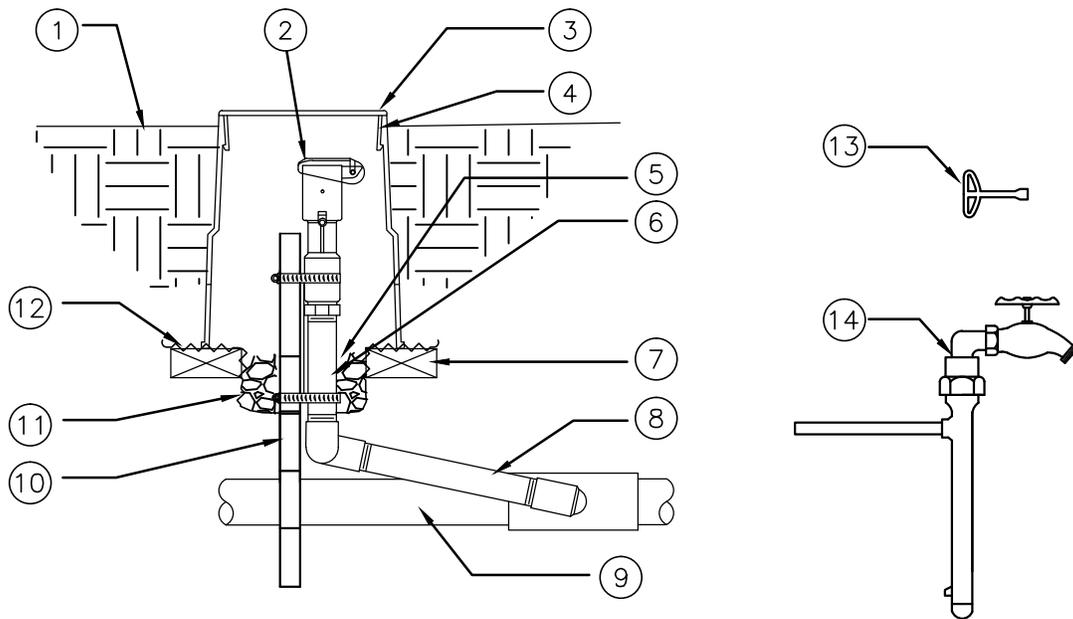
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-08

SCALE:
NONE

DATE:
7/1/15



1. FINISH GRADE/TOP OF MULCH
2. 1" TWO PART ALL BRASS QUICK COUPLING VALVE WITH YELLOW LOCKING LID
3. ROUND VALVE BOX WITH COVER, ENGRAVE CONTROL NUMBER AND "QC" ON LID WITH 2" INDENTED LETTERS
4. SET BOX 2" ABOVE FINISHED GRADE
5. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE
6. PVC SCH 80 RISER
7. BRICK TO SUPPORT VALVE BOX
8. MANUFACTURED TRIPLE SWING JOINT ASSEMBLY
9. SCH 40 PVC MAINLINE PIPE
10. # 4 REBAR 24" LONG MIN. WITH STEEL HOSE - TYPE CLAMP. 2 PER ASSEMBLY
11. INSTALL LANDSCAPE FABRIC AROUND 3/4" GRAVEL
12. 3/4" CLEAN GRAVEL - 4" DEEP UNDER VALVE
13. QUICK COUPLING COVER KEY - PROVIDE 2 PER JOB SITE
14. QUICK COUPLING QUILL MOUNTED BY AN ALL BRASS SWIVEL ADAPTER AND HOSE BIB - PROVIDE 2 PER JOB SITE



CITY OF VALLEJO STANDARD DETAIL

QUICK COUPLER DETAIL

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

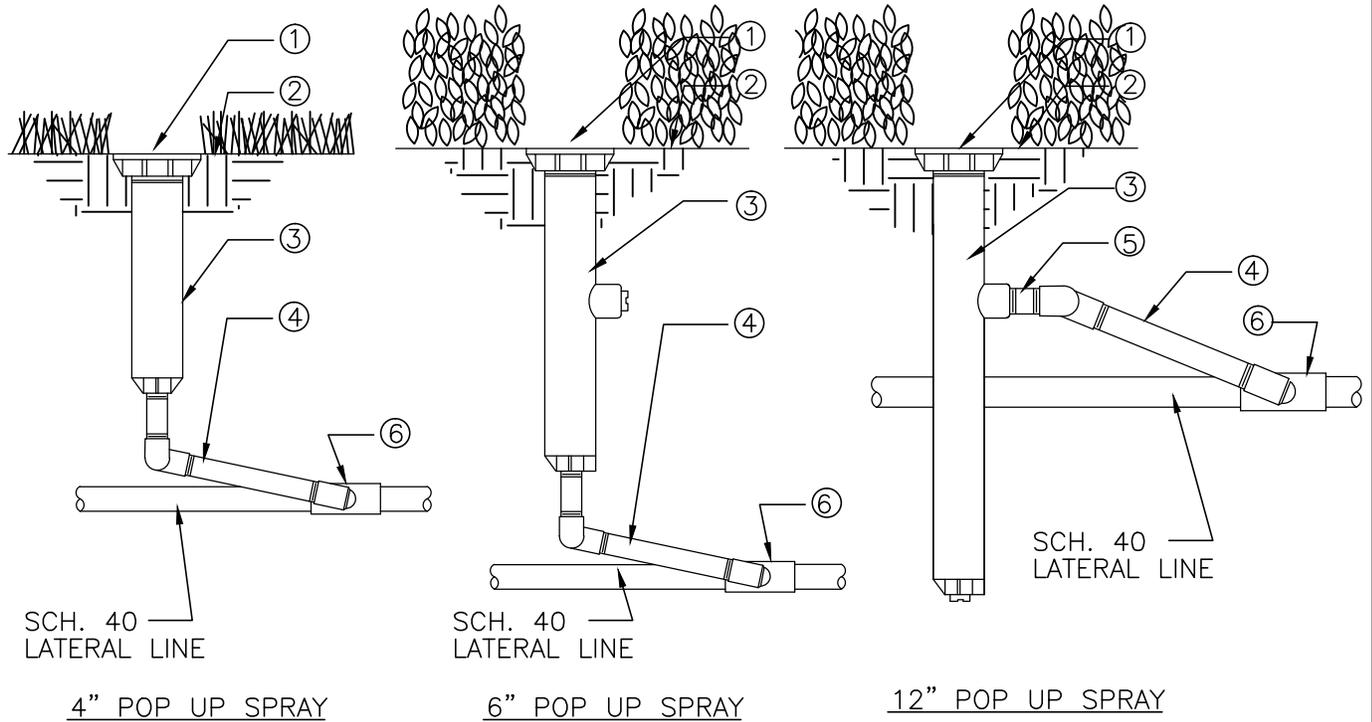
5-09

SCALE:

NONE

DATE:

7/1/15



1. MPR NOZZLE – SIZE PER PLAN
2. INSTALL SPRINKLER LEVEL WITH FINISHED GRADE
3. MPR POP UP SPRAY SPRINKLER
4. MANUFACTURED TRIPLE SWING JOINT ASSEMBLY
5. PVC SCH 80 NIPPLE – LENGTH AS REQUIRED
6. PVC SCH 80 TEE OR ELL

NOTE: NO SIDE FED POP-UP WILL BE ALLOWED ON HEADS WITH CHECK VALVES.



CITY OF VALLEJO STANDARD DETAIL

POP UP SPRAY AND SWING JOINT DETAIL

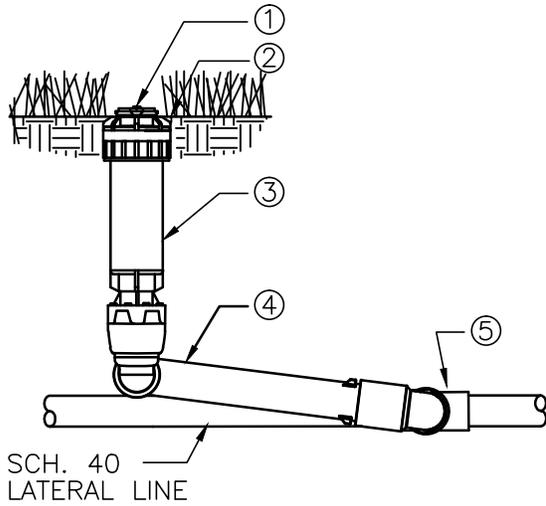
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

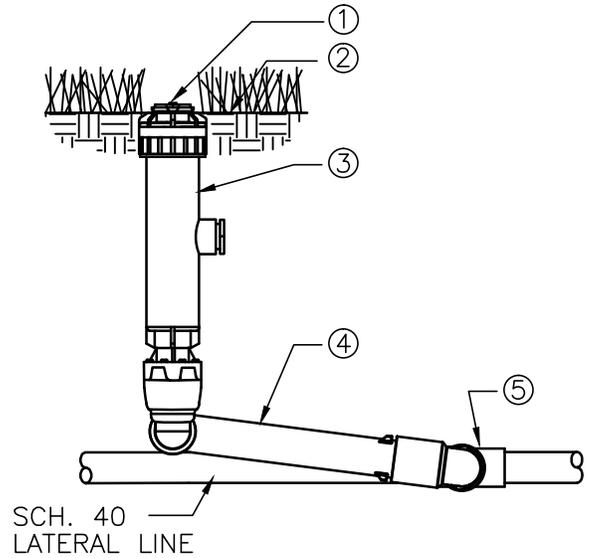
DRAWING NO:
5-10

SCALE:
NONE

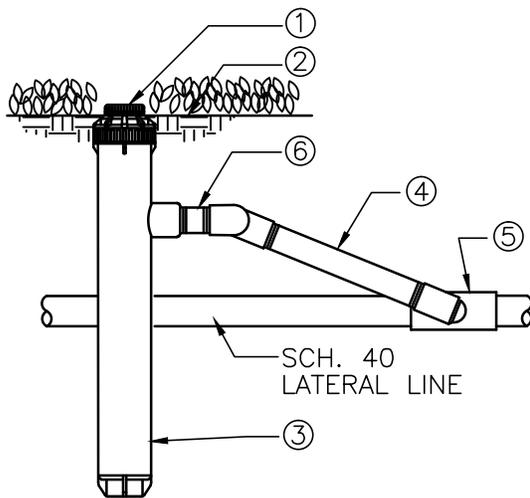
DATE:
7/1/15



ROTOR 4" POP-UP SPRINKLER



ROTOR 6" POP-UP SPRINKLER



ROTOR 12" POP-UP SPRINKLER

1. ROTOR NOZZLE – SIZE PER PLAN
2. INSTALL ROTOR LEVEL WITH FINISHED GRADE
3. ROTOR POP UP SPRINKLER
4. MANUFACTURED TRIPLE SWING JOINT ASSEMBLY
5. PVC SCH 80 TEE OR ELL
6. PVC SCH 80 NIPPLE – LENGTH AS REQUIRED

NOTE: NO SIDE FED ROTOR WILL BE ALLOWED ON HEADS WITH CHECK VALVES.



CITY OF VALLEJO STANDARD DETAIL

ROTOR DETAIL

APPROVED BY:

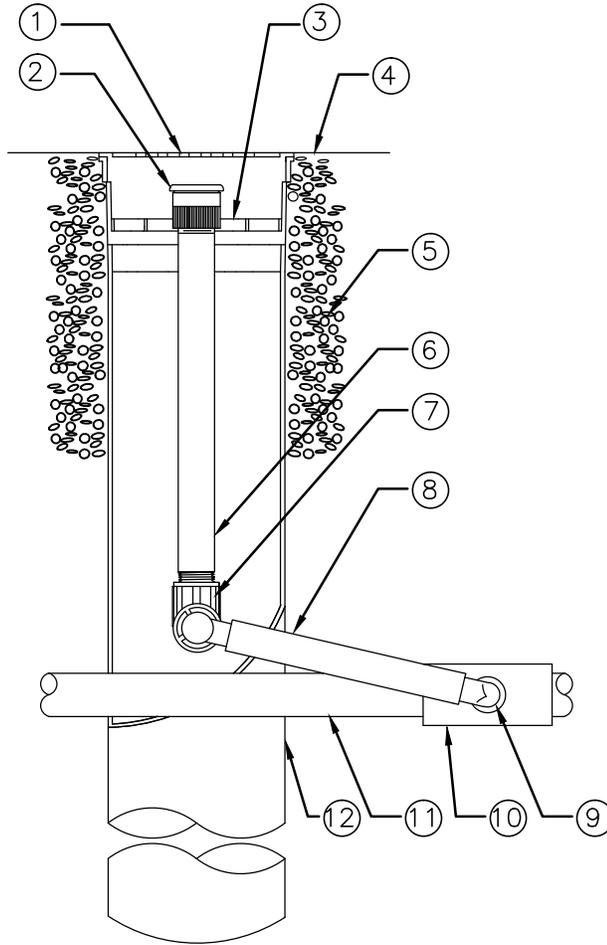
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-11

SCALE:
NONE

DATE:
7/1/15



- | | |
|--|---|
| <p>1. 4-INCH GRATE</p> <p>2. BUBBLER: RAIN BIRD 1402 0.50 GPM</p> <p>3. ROOT WATERING SYSTEM:
RAIN BIRD RWS-BG02
(INCLUDES 1402 0.50 GPM BUBBLER
WITH RISER, GRATE, SWING ASSEMBLY,
1/2" MALE NPT INLET, AND BASKET
CANISTER)</p> <p>4. FINISH GRADE</p> <p>5. OPTIONAL PEA GRAVEL
OR RWS SAND SOCK (RWS-SOCK)
FOR SANDY SOILS</p> | <p>6. 1/2-INCH PVC SCH 80 NIPPLE</p> <p>7. 1/2-INCH 90-DEGREE ELBOW</p> <p>8. 12-INCH SWING ASSEMBLY</p> <p>9. 1/2-INCH MALE NPT INLET</p> <p>10. PVC SCH 40 TEE OR EL</p> <p>11. PVC SCH 40 LATERAL LINE</p> <p>12. 4-INCH BASKET WEAVE CANISTER</p> |
|--|---|



CITY OF VALLEJO STANDARD DETAIL

**DEEP ROOT
TREE BUBBLER DETAIL**

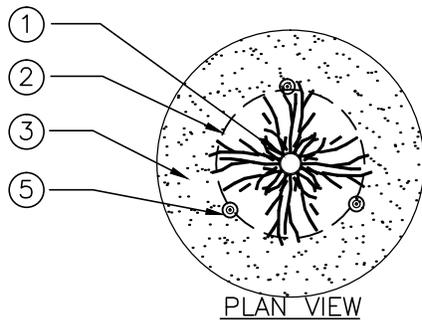
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

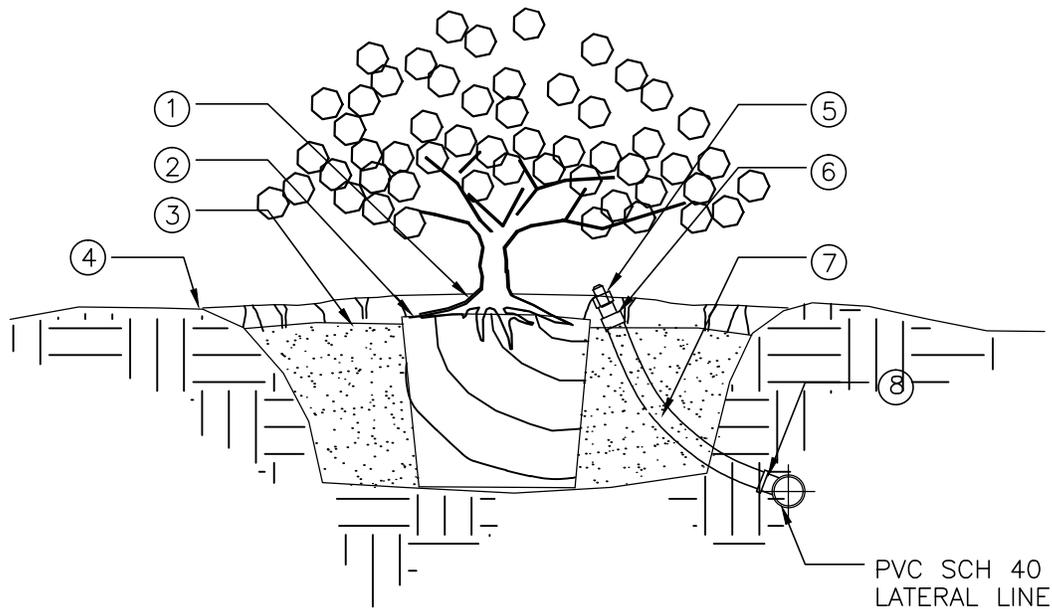
DRAWING NO:
5-12

SCALE:
NONE

DATE:
7/1/15



INSTALLATION CHART			
1	BUBBLER	PER 1	GAL SHRUB
2	BUBBLERS	PER 5	GAL SHRUB
3	BUBBLERS	PER 15	GAL TREE
3-4	BUBBLERS	PER 24"	BOX TREE
4-6	BUBBLERS	PER 36"	BOX TREE
CONSULT WITH CITY INSPECTOR FOR LARGER SPECIMEN PLANTINGS			
INSTALL EMITTER OUTLET(S) UPSLOPE OF PLANT			



1. ROOT CROWN
2. ROOT BALL
3. PLANTING EXCAVATION AREA
4. PLANT BASIN BERM
5. AGRIFIM SELF FLUSHING PRESSURE COMPENSATING BUBBLER – UFC-20 (2 GPH) SIZE PER IRRIGATION PLAN. LOCATE EMITTER AT PERIMETER OF ROOT BALL. SEE CHART FOR NUMBER OF BUBBLERS
6. 1/2" SCH 40 PVC MALE ADAPTER INSTALL SPRING-LOADED CHECK VALVE BETWEEN MALE ADAPTER AND BUBBLER NOZZLE WHERE NECESSARY TO CONTROL LOW OUTLET DRAINAGE
7. 1/2" IPS FLEXIBLE HOSE (PVC) (.840 OD) USE ONLY IPS WELD-ON #795 SOLVENT CEMENT WITH P-70 PRIMER ON THIS HOSE
8. PVC TEE OR ELBOW



CITY OF VALLEJO STANDARD DETAIL

DRIP BUBBLER DETAIL

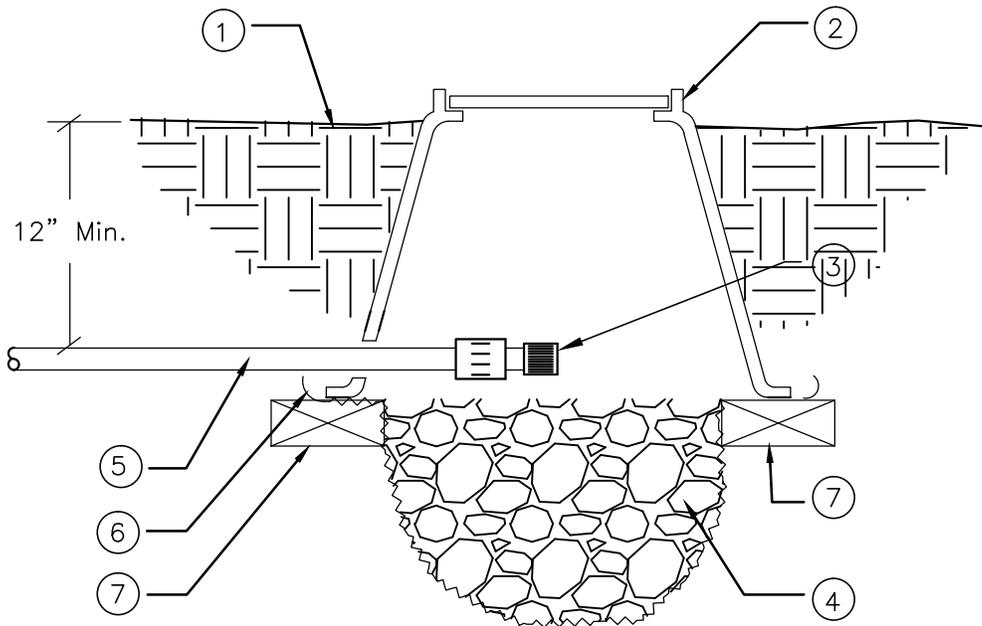
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-13

SCALE:
NONE

DATE:
7/1/15



ASSEMBLY TO SERVICE LATERAL RUNS UNDER 60 FT.

1. FINISH GRADE/TOP OF MULCH
2. RECTANGULAR PLASTIC IRRIGATION BOX WITH BOLT DOWN LID. SET BOX 2" ABOVE FINISHED GRADE
3. FLUSH CAP
4. 3/4" CLEAN GRAVEL – 4" LAYER
5. SCHEDULE 40 PVC LATERAL LINE
6. INSTALL LANDSCAPE FABRIC AROUND GRAVEL
7. BRICK TO SUPPORT VALVE BOX

NOTES

LOCATE IRRIGATION BOX ON DOWNHILL SIDE OF LATERAL RUN.

2" INDENTED LETTERS ON LID SHOWING 'F.V.' AS WELL AS CONTROL VALVE NUMBER BOX



CITY OF VALLEJO STANDARD DETAIL

FLUSH VALVE DETAIL

APPROVED BY:

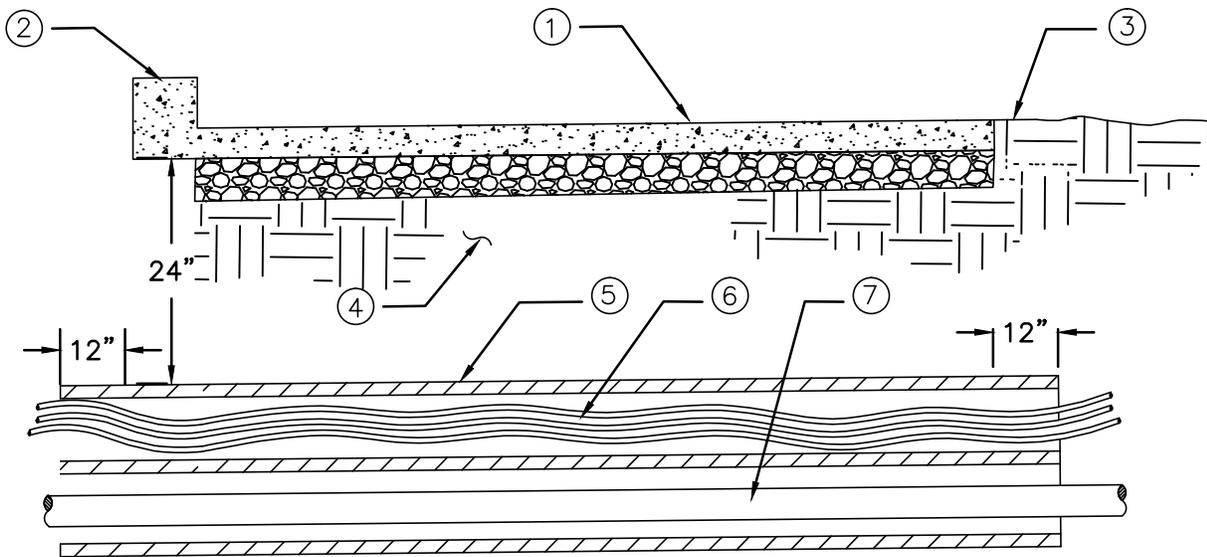
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-14

SCALE:
NONE

DATE:
7/1/15



1. HARDSCAPE SURFACE (DRIVEWAY, WALK, ETC.)
2. MARK CURB/SIDEWALK WITH PAINT OR GRIND MARK INDICATING SLEEVE LOCATION
3. FINISHED GRADE
4. COMPACTED SUBGRADE
5. IRRIGATION SLEEVE(S) 4" SIZE OR APPROVED EQUAL, EXTEND 12" BEYOND HARDSCAPE BOTH SIDES.
6. IRRIGATION CONTROL WIRING
7. PVC SCH 40 LATERAL OR PVC SCH 40 MAINLINE

NOTE: SLEEVES ARE TO EXTEND 12" BEYOND EDGE OF PAVING, BOTH WAYS.
 PROVIDE SEPARATE SLEEVE FOR MAIN LINE, LATERAL LINE, AND WIRING.



CITY OF VALLEJO STANDARD DETAIL

SLEEVING DETAIL

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

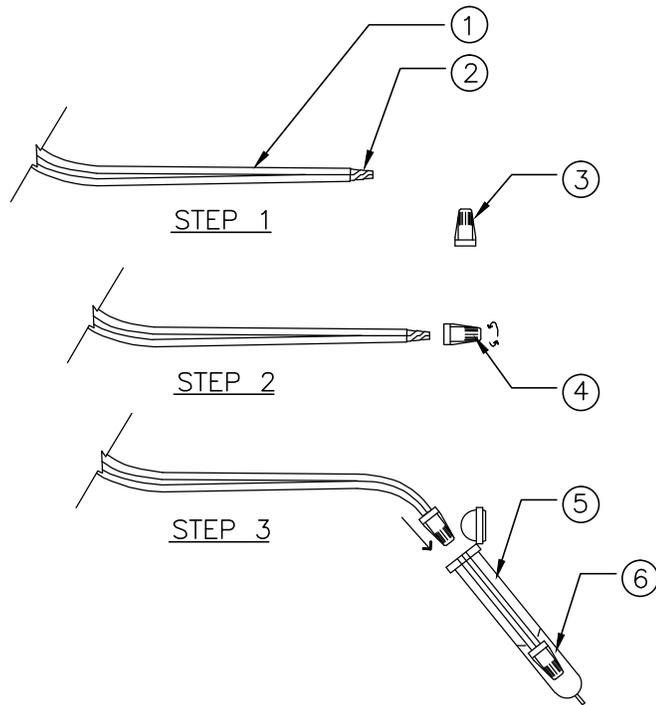
5-15

SCALE:

NONE

DATE:

7/1/15



PROFILES

1. CONTROL WIRES
2. STRIP, CLEAN & DRY WIRES APPROXIMATELY 5/8" FROM END AND TWIST TOGETHER CLOCKWISE.
3. INSULATED ELECTRICAL CONNECTOR. MATCH CONNECTOR SIZE TO THE SIZE AND THE NUMBERS OF WIRES.
4. TWIST ELECTRICAL CONNECTOR OVER ENDS OF EXPOSED WIRES UNTIL FINGER TIGHT.
5. 3M DBY SPLICE KIT WATERPROOF CONNECTOR.
6. INSERT SPLICED WIRES INTO MOISTURE SEAL TUBE AND SECURE CAP.

NOTES

PROVIDE 24" EXPANSION LOOP OF CONTROL WIRE FOR FUTURE EXPANSION.
 BUNDLE & TAPE WIRES
 ALL CONNECTIONS SHALL HAVE SPICE KIT
 ALL SPLICES HAVE TO BE MADE IN VALVE BOX.



CITY OF VALLEJO STANDARD DETAIL

VALVE WIRE SPLICE DETAIL

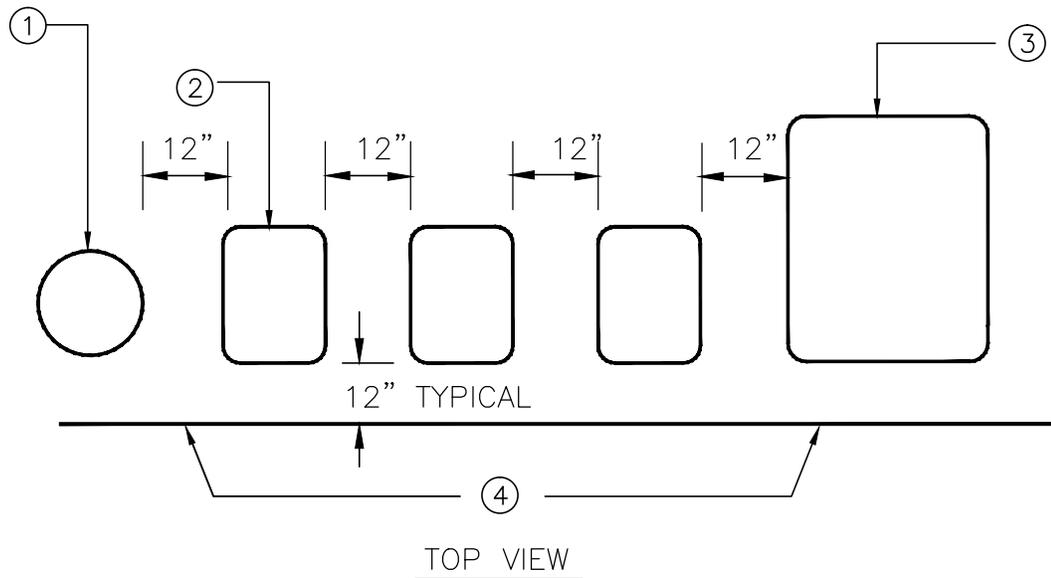
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-16

SCALE:
NONE

DATE:
7/1/15



1. 10" DIAMETER ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID FOR QUICK COUPLING VALVE OR ISOLATION BALL VALVE
2. 11-3/4" x 17" x 12" DEEP VALVE BOX WITH BOLT DOWN LID
3. 16" x 25-1/2" x 15" DEEP RECTANGULAR VALVE BOX WITH BOLT DOWN LID FOR FILTER MANIFOLD ASSEMBLY, OR 1-1/4" AND LARGER VALVE ASSEMBLIES.
4. EDGE OF LAWN, WALK, FENCE, CURB, ETC.

NOTES

ALIGN VALVE BOX OVER ASSEMBLY TO FACILITATE SERVICING COMPONENTS.
 ALL COMPONENTS WITHIN VALVE BOXES SHALL BE COMPLETELY ACCESSIBLE FOR SERVICE AND MAINTENANCE (TYPICAL)

SET BOXES 2" ABOVE FINISH GRADE

SET RCV AND VALVE BOX ASSEMBLY IN GROUND COVER / SHRUB AREAS.
 DO NOT INSTALL IN LAWN AREAS.

SET BOXES PARALLEL TO EACH OTHER AND PERPENDICULAR TO EDGE OF LAWN, WALK, FENCE, CURB, ETC.

AVOID HEAVILY COMPACTING SOIL AROUND VALVE BOXES TO PREVENT COLLAPSE AND DEFORMATION OF VALVE BOX SIDES.

INSTALL EXTENSION BY VALVE BOX MANUFACTURER AS REQUIRED TO COMPLETELY ENCLOSE ASSEMBLY FOR EASY ACCESS.

ENGRAVE CONTROL NUMBER AND VALVE NUMBER ON LID WITH 2" INDENTED LETTERS.



CITY OF VALLEJO STANDARD DETAIL

**IRRIGATION VALVE BOX
 INSTALLATION DETAIL**

APPROVED BY:

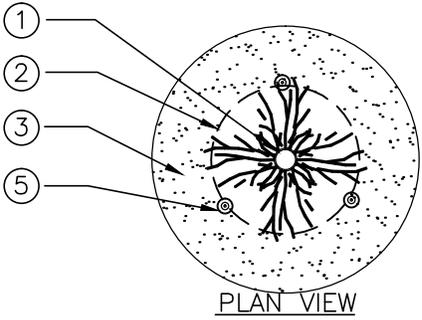
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

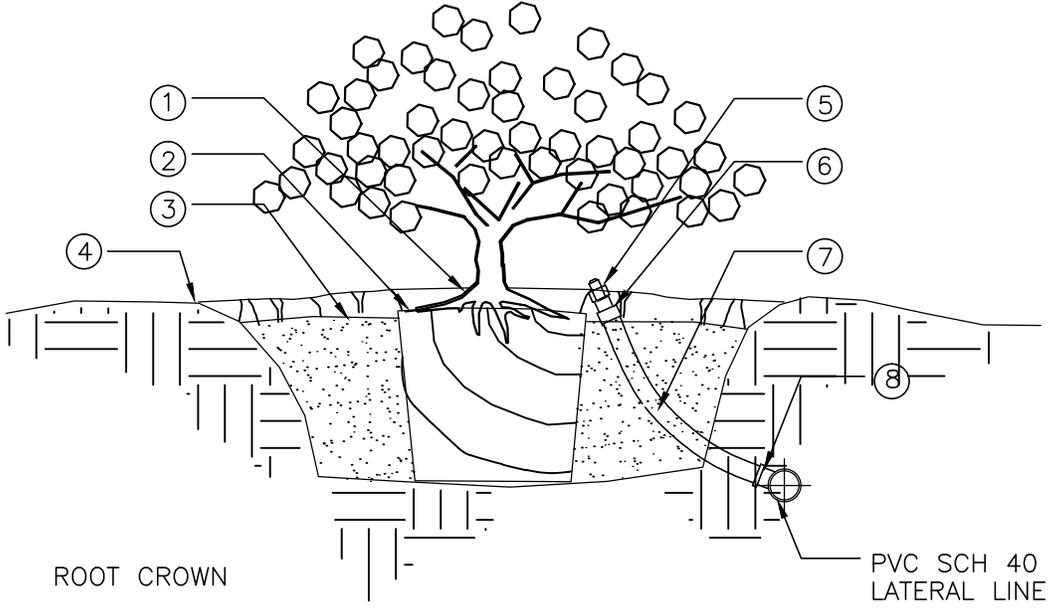
5-17

SCALE:
 NONE

DATE:
 7/1/15



INSTALLATION CHART			
1	EMITTER	PER 1	GAL SHRUB
2	EMITTERS	PER 5	GAL SHRUB
3	EMITTERS	PER 15	GAL TREE
3-4	EMITTERS	PER 24"	BOX TREE
4-6	EMITTERS	PER 36"	BOX TREE
CONSULT WITH CITY INSPECTOR FOR LARGER SPECIMEN PLANTINGS			
INSTALL EMITTER OUTLET(S) UPSLOPE OF PLANT			



1. ROOT CROWN
2. ROOT BALL
3. PLANTING EXCAVATION AREA
4. PLANT BASIN BERM
5. RAINBIRD PRESSURE COMPENSATING EMITTER – PCT-10 (GREEN, 10 GPH) SIZE PER IRRIGATION PLAN. LOCATE EMITTER AT PERIMETER OF ROOT BALL. SEE CHART FOR NUMBER OF BUBBLERS
6. 1/2" SCH 40 PVC MALE ADAPTER INSTALL SPRING-LOADED CHECK VALVE BETWEEN MALE ADAPTER AND BUBBLER NOZZLE WHERE NECESSARY TO CONTROL LOW OUTLET DRAINAGE
7. 1/2" IPS FLEXIBLE HOSE (PVC) (.840 OD) USE ONLY IPS WELD-ON #795 SOLVENT CEMENT WITH P-70 PRIMER ON THIS HOSE
8. PVC TEE OR ELBOW

FLOW DEMAND MUST BE GREATER THAN 7 G.P.M.
IF LESS, USE BUBBLER DETAIL 5-19 TO ACHIEVE PROPER FLOW.



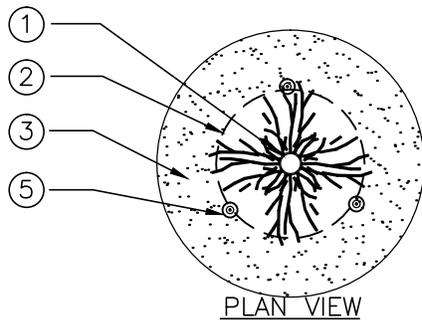
CITY OF VALLEJO STANDARD DETAIL

**DRIP EMITTER DETAIL
FOR SYSTEM FLOW
GREATER THAN 7 GPM**

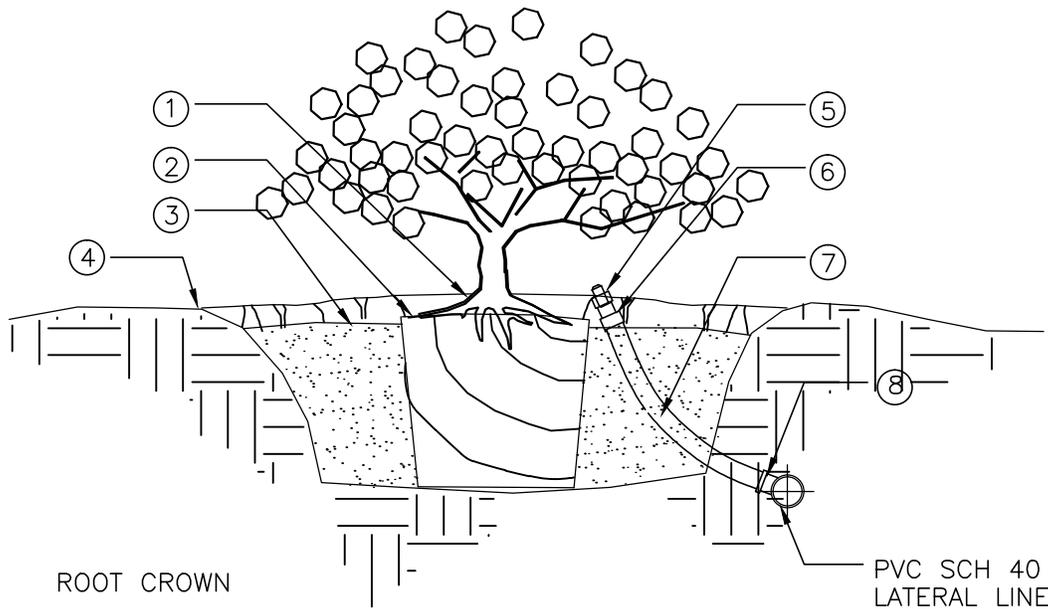
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO: 5-18
SCALE: NONE
DATE: 7/1/15



INSTALLATION CHART			
1	BUBBLER PER 1	GAL SHRUB	
1	BUBBLERS PER 5	GAL SHRUB	
2	BUBBLERS PER 15	GAL TREE	
2-3	BUBBLERS PER 24"	BOX TREE	
3-4	BUBBLERS PER 36"	BOX TREE	
CONSULT WITH CITY INSPECTOR FOR LARGER SPECIMEN PLANTINGS			
INSTALL BUBBLER(S) UPSLOPE OF PLANT			



1. ROOT CROWN
2. ROOT BALL
3. PLANTING EXCAVATION AREA
4. PLANT BASIN BERM
5. RAINBIRD PRESSURE COMPENSATING BUBBLERS – 1400 SERIES (.25 TO 2.0 GPM) SIZE PER IRRIGATION PLAN. LOCATE EMITTER AT PERIMETER OF ROOT BALL. SEE CHART FOR NUMBER OF BUBBLERS
6. 1/2" SCH 40 PVC MALE ADAPTER INSTALL SPRING-LOADED CHECK VALVE BETWEEN MALE ADAPTER AND BUBBLER NOZZLE WHERE NECESSARY TO CONTROL LOW OUTLET DRAINAGE
7. 1/2" IPS FLEXIBLE HOSE (PVC) (.840 OD) USE ONLY IPS WELD-ON #795 SOLVENT CEMENT WITH P-70 PRIMER ON THIS HOSE
8. PVC TEE OR ELBOW

FLOW DEMAND MUST BE GREATER THAN 7 G.P.M.
IF LESS, USE HIGHER FLOW BUBBLER TO ACHIEVE PROPER FLOW.



CITY OF VALLEJO STANDARD DETAIL

**DRIP BUBBLER DETAIL
FOR LOW FLOW SYSTEM**

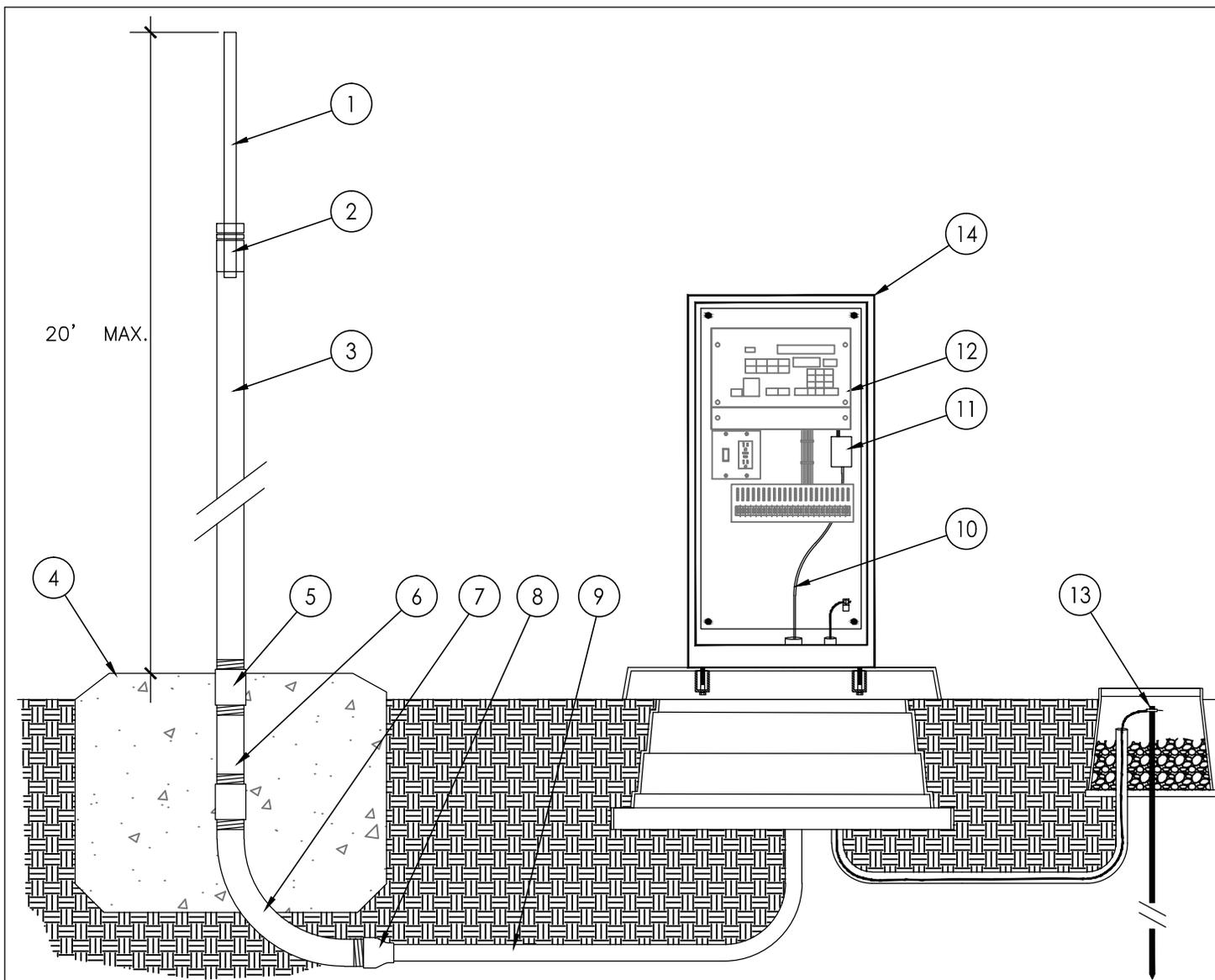
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-19

SCALE:
NONE

DATE:
7/1/15



- ① RAIN MASTER EV-ANT-F ANTENNA.
- ② RAIN MASTER EV-ANT-KIT COUPLING.
- ③ 1-1/2" GALVANIZED STEEL POLE.
- ④ 3' x 3' x 3' CONCRETE FOOTING FOR POLE.
- ⑤ 1-1/2" GALVANIZED COUPLING.
- ⑥ 1-1/2" GALVANIZED PIPE AND FITTINGS AS NECESSARY.
- ⑦ 1-1/2" GALVANIZED SWEEP ELL. SET IN CONCRETE FOOTING.
- ⑧ 1" x 1-1/2" SxT PVC REDUCER FITTING.
- ⑨ 1" PVC ELECTRICAL CONDUIT FOR WIRING TO CONTROLLER LOCATION.
- ⑩ RAIN MASTER HIGH GAIN ANTENNA CABLE.
- ⑪ RAIN MASTER RADIO MODEM FOR COMMUNICATION. ALSO INCLUDES OUT PORT FOR HARDWIRE.
- ⑫ RAIN MASTER DX2. (SEE CONTROLLER DETAIL).
- ⑬ GROUNDING. (SEE CONTROLLER DETAIL)
- ⑭ SA1 - 18"W x 36"H x 12"D FRONT ENTRY PEDESTAL SHOWN. SEE LEGEND FOR ACTUAL TYPE.



CITY OF VALLEJO STANDARD DETAIL

**RADIO-HIGH GAIN ANTENNA
(RHG)**

APPROVED BY:

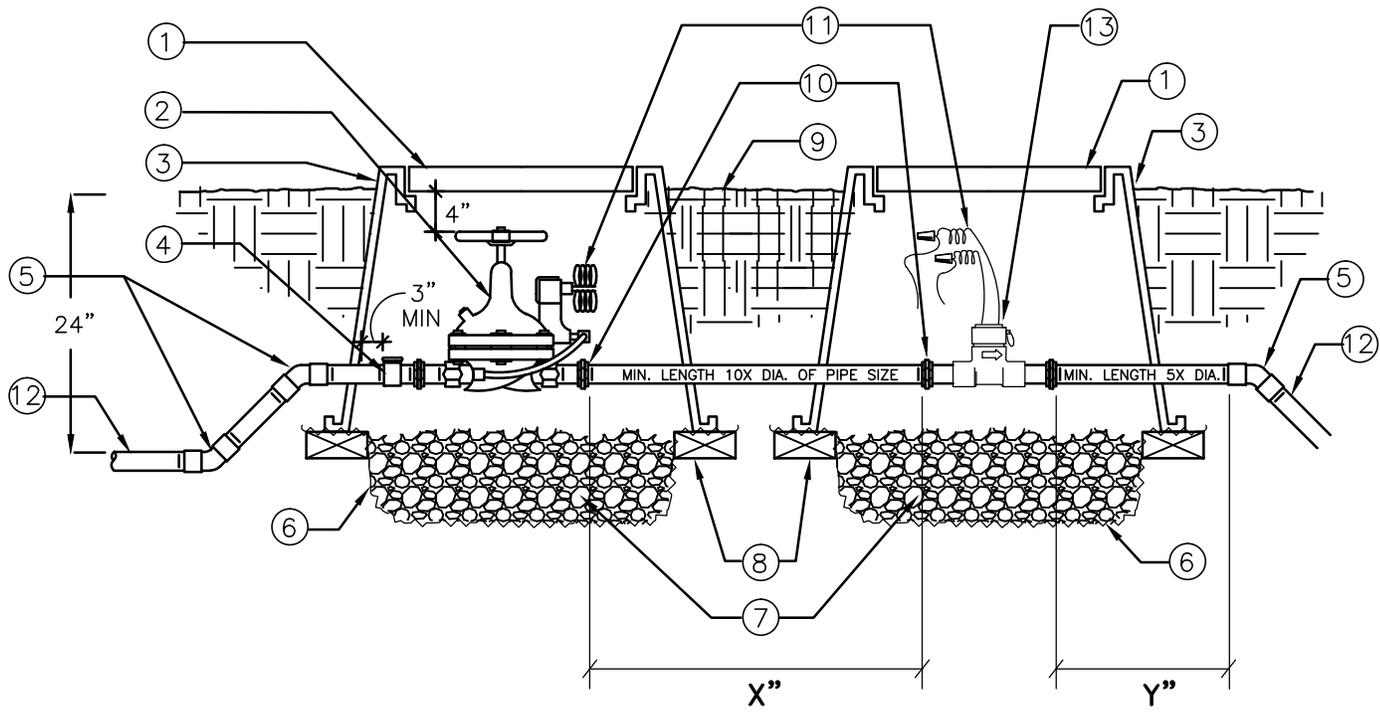
[Signature]

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-20

SCALE:
NONE

DATE:
7/1/15



1. RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID, ONE VALVE PER BOX
2. MASTER CONTROL VALVE WITH FLOW CONTROL AND MANUAL BLEED
3. SET BOX 2" ABOVE GRADE
4. THREADED BRONZE BALL VALVE IN 1-1/2" AND SMALLER ASSEMBLIES, THREADED BRONZE GATE VALVE IN 2" OR LARGER ASSEMBLIES.
5. SCHEDULE 80 PVC NIPPLES (TBE) AND 45° THREADED ELBOWS TYPICAL BOTH SIDES OF VALVE.
6. INSTALL LANDSCAPE FILTER FABRIC UNDER GRAVEL
7. 3/4" CLEAN GRAVEL - 4" DEEP BELOW VALVE (NO SOIL IN BOX)
8. BRICK - 1 AT EACH CORNER OF VALVE BOX
9. FINISH GRADE
10. SCHEDULE 80 PVC THREADED UNION (2 TOTAL)
11. VALVE CONTROL WIRE - PROVIDE 3M-DBY SEAL PACKS AT ALL SPLICES AND 36" OF EXCESS UF WIRE I A 1" DIAMETER COIL
12. SCHEDULE 40 MAINLINE
13. FM FLOW SENSOR - WIRE TO CONTROLLER AS DIRECTED BY MANUFACTURER RECOMMENDATIONS.

NOTE: THE CONTRACTOR SHALL INSTALL FLOW SENSOR TO ALLOW STRAIGHT-FLOW OF A MINIMUM OF TEN TIMES THE DIAMETER OF MAINLINE PIPE ON THE INLET (X) SIDE AND FIVE TIMES THE DIAMETER OF MAINLINE PIPE ON THE OUTLET (Y) SIDE OF THE SENSOR.



CITY OF VALLEJO STANDARD DETAIL

MASTER VALVE AND FLOW CONTROL DETAIL

APPROVED BY:

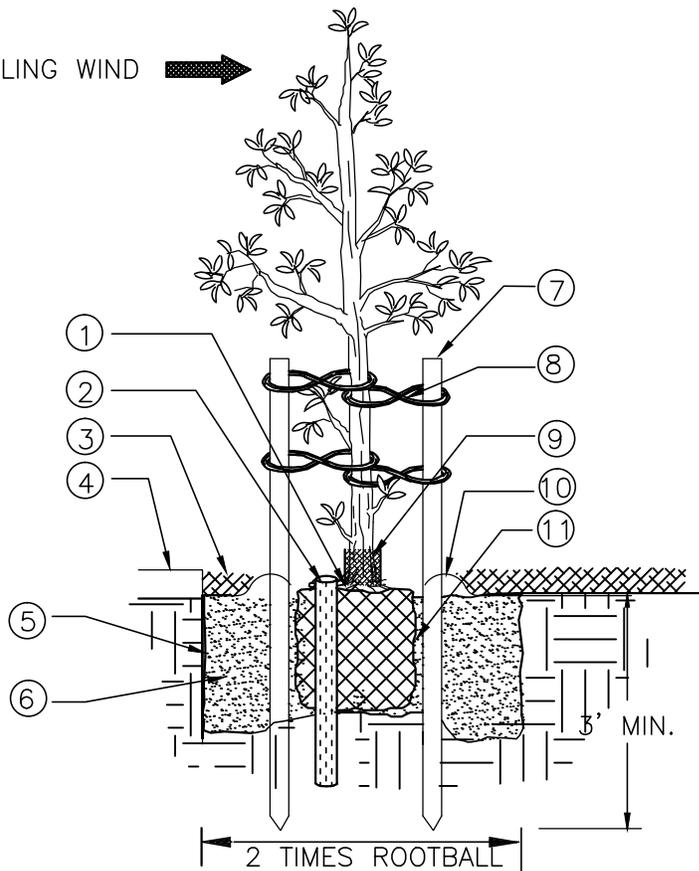
DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-21

SCALE:
NONE

DATE:
7/1/15

OPPOSITE PREVAILING WIND 



1. INSTALL TREE SO ROOTBALL IS 1" ABOVE FINISH GRADE AFTER SETTLING
2. INSTALL 2 VERTICAL DRAINS – 3" x 24" PERFORATED PIPE, FILLED WITH PEA GRAVEL. LOCATE DRAINS 16" AWAY FROM TRUNK ON EITHER SIDE 90 DEGREES FROM TREE STAKES.
3. 2" LAYER MULCH
4. HARDSCAPE
5. INSTALL LINEAR ROOT BARRIER ADJACENT TO HARDSCAPE SEE DETAIL 5-35
6. PLANTING PIT DEPTH SHALL BE 1" LESS THAN DEPTH OF ROOT BALL, BOTTOM SHALL REST ON UNDISTURBED SOIL. BACK FILL WITH AMENDED SOIL PER SOILS REPORT.
7. 2" x 8' UNTREATED LODGEPOLE STAKES POSITION UP WIND APX. 16" FROM TRUNK CUT STAKES 2" ABOVE STRAP
8. 1" WIDE RUBBER TIRE TREE TIES IN FIGURE 8 PATTERN. ATTACH WITH GALV. NAILS
9. INSTALL 'ARBOR GUARDS' AT BASE OF TRUNK
10. WATERING BASIN AT EDGE OF ROOTBALL
11. SCARIFY SIDES OF ROOTBALL TO ELIMINATE COMPACTIONS AND/OR GLAZING. SET ROOTBALL ON UNDISTURBED SOIL.



CITY OF VALLEJO STANDARD DETAIL

**15 GALLON TREE
PLANTING DETAIL**

APPROVED BY:

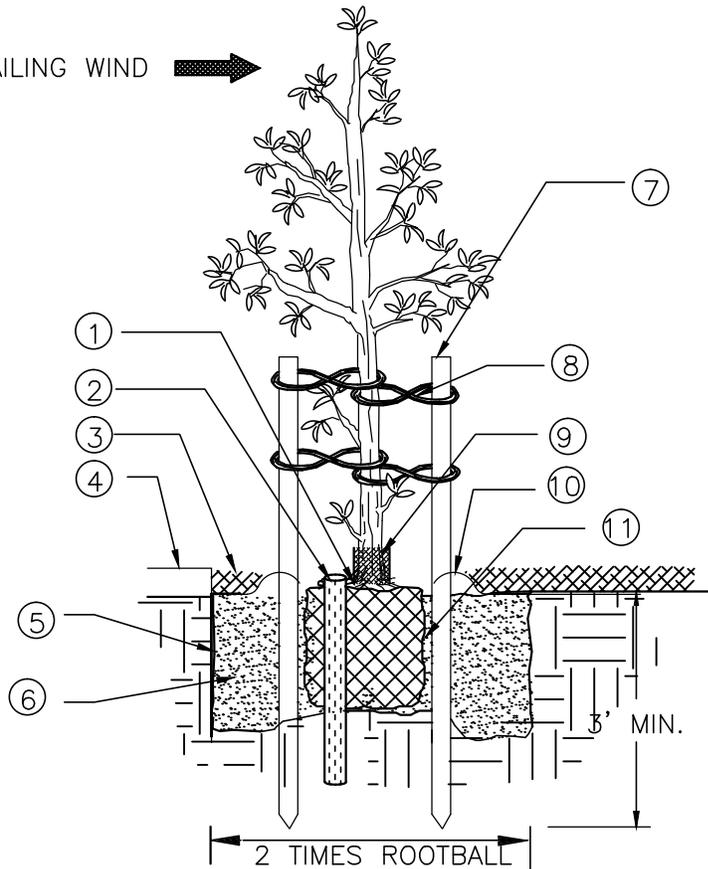
DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-26

SCALE:
NONE

DATE:
7/1/15

OPPOSITE PREVAILING WIND →



1. INSTALL TREE SO ROOTBALL IS 1" ABOVE FINISH GRADE AFTER SETTLING
2. INSTALL 2 VERTICAL DRAINS – 3" x 24" PERFORATED PIPE, FILLED WITH PEA GRAVEL. LOCATE DRAINS 16" AWAY FROM TRUNK ON EITHER SIDE 90 DEGREES FROM TREE STAKES.
3. 2" LAYER MULCH
4. HARDSCAPE
5. INSTALL LINEAR ROOT BARRIER ADJACENT TO HARDSCAPE SEE DETAIL 5-35
6. PLANTING PIT DEPTH SHALL BE 1" LESS THAN DEPTH OF ROOT BALL, BOTTOM SHALL REST ON UNDISTURBED SOIL. BACK FILL WITH AMENDED SOIL PER SOILS REPORT.
7. 3" x 12" UNTREATED LODGEPOLE STAKES POSITION UP WIND APX. 16" FROM TRUNK CUT STAKES 2" ABOVE STRAP
8. 1" WIDE RUBBER TIRE TREE TIES IN FIGURE 8 PATTERN. ATTACH WITH GALV. NAILS
9. INSTALL 'ARBOR GUARDS' AT BASE OF TRUNK
10. WATERING BASIN AT EDGE OF ROOTBALL
11. SCARIFY SIDES OF ROOTBALL TO ELIMINATE COMPACTIONS AND/OR GLAZING. SET ROOTBALL ON UNDISTURBED SOIL.



CITY OF VALLEJO STANDARD DETAIL

**24" BOX OR LARGER TREE
PLANTING DETAIL**

APPROVED BY:

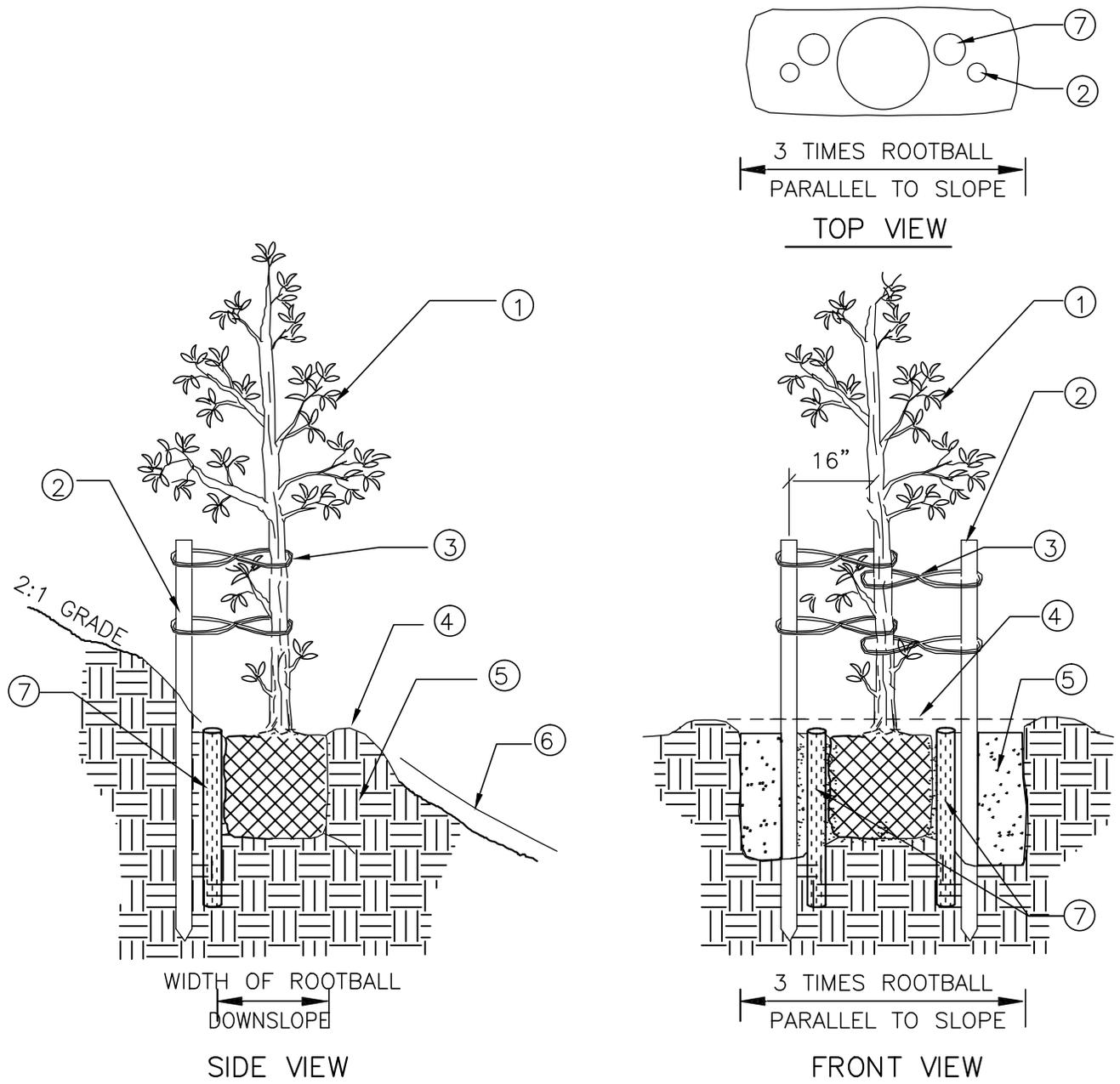
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-27

SCALE:
NONE

DATE:
7/1/15



1. APPROVED TREE, SCARIFY SIDE OF ROOTBALL, SET ON UNDISTURBED SOIL
2. TWO 2" x 8' UNTREATED LODGEPOLE STAKES POSITION UP WIND APX. 16" FROM TRUNK CUT STAKES 2" ABOVE STRAP.
3. TWO 1" WIDE RUBBER TIES PER STAKE IN FIGURE 8 PATTERN. ATTACH WITH GALV. NAILS
4. PROVIDE 4" BERMING ON DOWNSLOPE SIDE
5. AMENDED SOIL PER SOILS REPORT
6. 2" LAYER 'ARBOR MULCH' OVER 2" LAYER COMPOST
7. INSTALL 2 VERTICAL DRAINS - 3" x 24" PERFORATED PIPE, FILLED WITH PEA GRAVEL. LOCATE DRAINS ON EITHER SIDE OF PLANTING PIT.



CITY OF VALLEJO STANDARD DETAIL

**SLOPE TREE
PLANTING DETAIL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

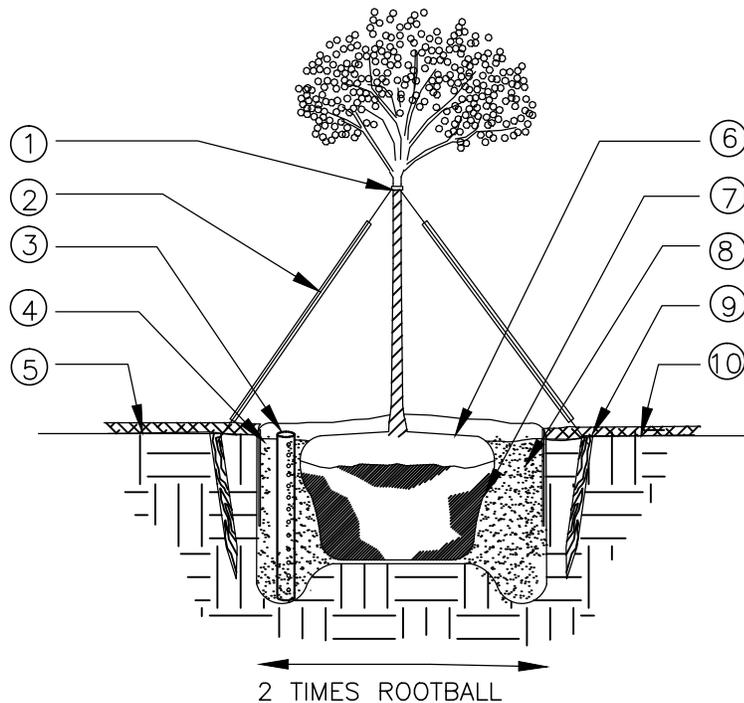
5-28

SCALE:

NONE

DATE:

7/1/15



1. RUBBER HOSE AROUND WIRE
2. GUY WIRES (3) W/ SAFETY PVC SLEEVE , SPACE EQUAL DISTANCE AROUND TREE
3. INSTALL 2 VERTICAL DRAINS – 3” x 36” PERFORATED PIPE, FILLED WITH PEA GRAVEL. LOCATE DRAINS 16” AWAY FROM TRUNK ON EITHER SIDE.
4. INSTALL LINEAR ROOT BARRIER ADJACENT TO HARDSCAPE
5. FINISH GRADE
6. INSTALL TREE SO ROOTBALL IS 1” ABOVE FINISH GRADE AFTER SETTLING
7. SCARIFY SIDES OF ROOTBALL
8. PLANTING PIT SCARIFY SIDES TO ELIMINATE COMPACTIONS AND/OR GLAZING BACKFILL WITH AMENDED SOIL PER SOILS REPORT
9. 2” x 4” x 18” STAKE
10. 2” LAYER MULCH

2” SAUCER BERM CUT 8” CIRCLE IN SOD AROUND TRUNK OF TREE FROM BASIN. TURN DOWN TOP THIRD OF BURLAP BALL OR REMOVE CONTAINERS AND TIES.



CITY OF VALLEJO STANDARD DETAIL

TREE GUYING DETAIL

APPROVED BY:

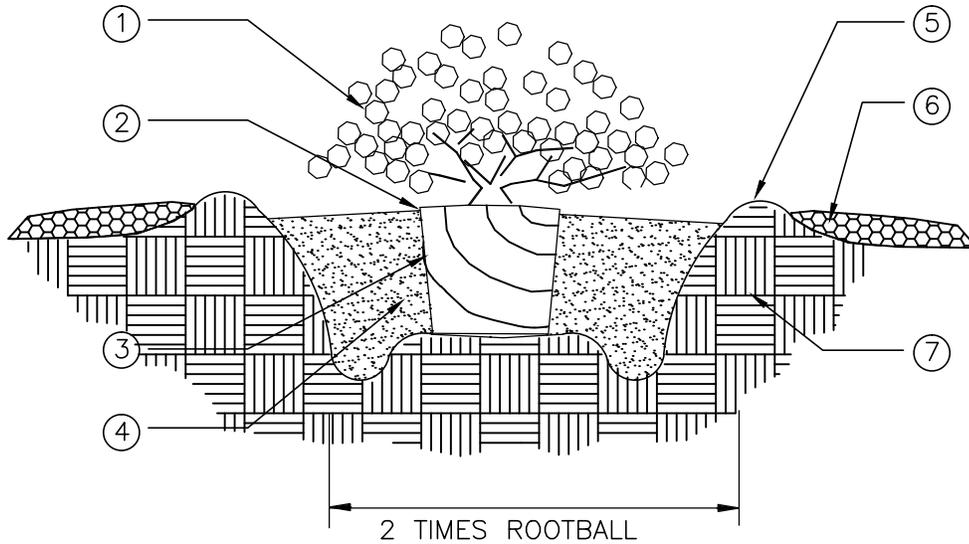
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-29

SCALE:
NONE

DATE:
7/1/15



1. APPROVED SHRUB
2. SET CROWN OF ROOTBALL 1" ABOVE FINISH GRADE AFTER WATERING AND SETTLING
3. WELL DEVELOPED ROOTBALL SCARIFY SIDES OF ROOTBALL AND PLANTING PIT
4. PLANTING PIT – BACKFILL WITH AMENDED SOIL PER SOILS REPORT
5. 2" HIGH SOIL BERM AROUND DRIPLINE
6. 2" LAYER OF APPROVED FIR MULCH TOP DRESSING. KEEP MULCH OUTSIDE OF SOIL BERM.
7. UNDISTURBED SOIL



CITY OF VALLEJO STANDARD DETAIL
SHRUB PLANTING DETAIL

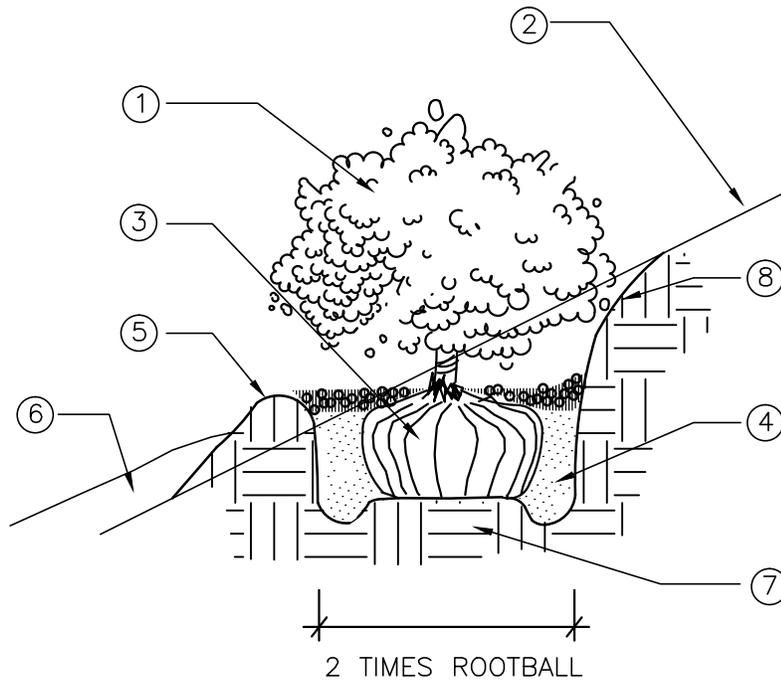
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-30

SCALE:
 NONE

DATE:
 7/1/15



1. APPROVED SHRUB
2. 2:1 EXISTING SLOPE
3. WELL DEVELOPED ROOTBALL, SET ON UNDISTURBED SOIL. CROWN TO BE 1" ABOVE GRADE. SCARIFY SIDES OF ROOTBALL AND PLANTING PIT
4. PLANTING PIT – BACKFILL WITH AMENDED SOIL PER SOILS REPORT
5. 3" HIGH SOIL BERM AROUND DOWNSLOPE DRIPLINE
6. 2" LAYER OF APPROVED MULCH TOP DRESSING. KEEP MULCH OUTSIDE OF SOIL BERM.
7. UNDISTURBED SOIL
8. TAPER BACK OF PLANTING PIT TO MEET EXISTING GRADE.



CITY OF VALLEJO STANDARD DETAIL

**SLOPE SHRUB
PLANTING DETAIL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

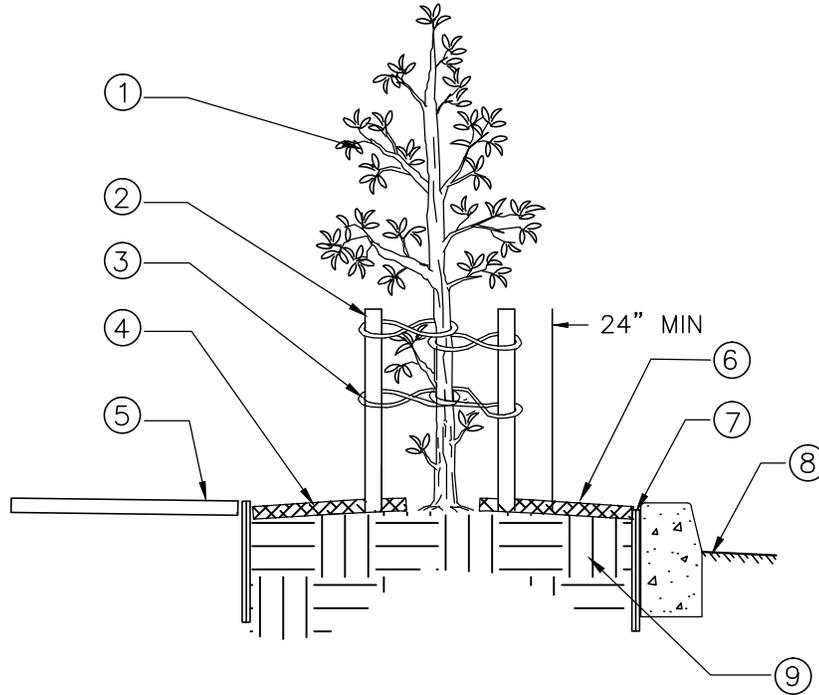
5-31

SCALE:

NONE

DATE:

7/1/15



1. APPROVED STREET TREE
2. UNTREATED LODGEPOLE STAKES
3. RUBBER TREE TIES
4. 2" LAYER OF FIR MULCH
5. SIDEWALK / PRIVATE YARD – REFER TO IMPROVEMENT PLANS
6. GRADE SOIL TO MAINTAIN POSITIVE DRAINAGE
7. INSTALL LINEAR ROOT BARRIER ADJACENT TO HARDSCAPE SEE DETAIL 5-35
8. ROAD SURFACE
9. AMENDED TOPSOIL

NOTE: REFER TO CITY TREE PLANTING DETAILS 5-26, 5-27
 ALL MEDIAN GORE ENDS LESS THAN 20" BETWEEN CURB SHALL BE
 FILLED WITH COBBLE REFER TO CITY COBBLE DETAIL 5-38



CITY OF VALLEJO STANDARD DETAIL

**MEDIAN AND GORE TREE
 PLANTING DETAIL**

APPROVED BY:

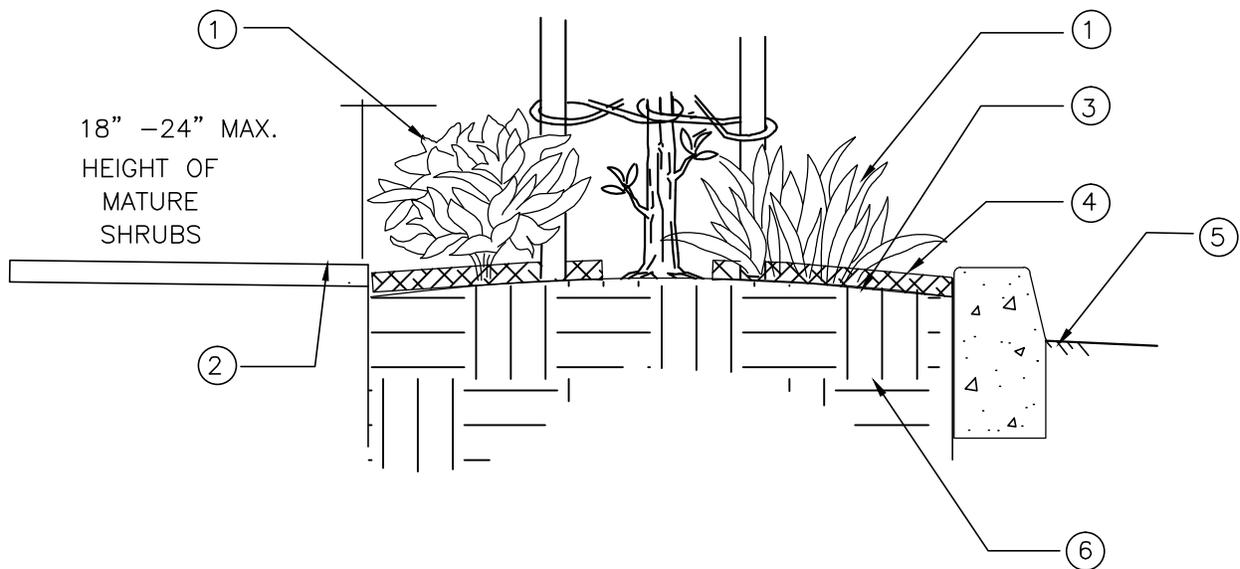
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-32

SCALE:
 NONE

DATE:
 7/1/15



1. APPROVED SHRUB
2. SIDEWALK / PRIVATE YARD – REFER TO IMPROVEMENT PLANS
3. GRADE SOIL TO MAINTAIN POSITIVE DRAINAGE
4. 2" LAYER OF FIR MULCH
5. ROAD SURFACE
6. AMENDED TOPSOIL

NOTE: REFER TO CITY SHRUB PLANTING DETAIL 5-30
ALL MEDIAN GORE ENDS LESS THAN 20" BETWEEN CURB SHALL BE
FILLED WITH COBBLE REFER TO CITY COBBLE DETAIL 5-38



CITY OF VALLEJO STANDARD DETAIL

**MEDIAN GORE SHRUB
PLANTING DETAIL**

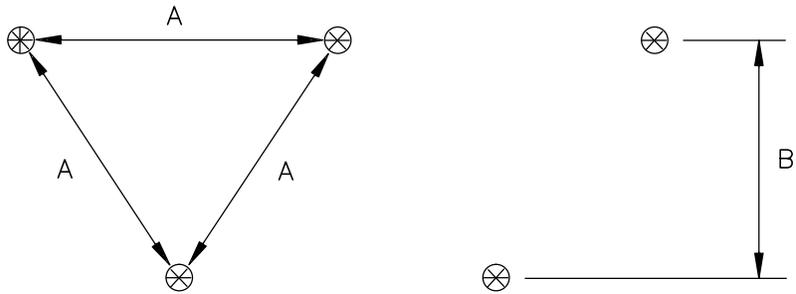
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-33

SCALE:
NONE

DATE:
7/1/15



TYPICAL PLANT LOCATION

FOR USE WHEN PLANTS ARE SPACED EQUAL DISTANCE FROM EACH OTHER AS IN ALL GROUND COVER PLANTING, UNLESS SPECIFICALLY SHOWN ON THE LANDSCAPE PLAN AS TO COUNT AND SPACING.

PLANT QUANTITY CHART		
SPACING 'A'	SPACING 'B'	NO. PLANTS PER S.F.
6" O.C.	5.20"	4.60
9" O.C.	7.79"	1.78
12" O.C.	10.40"	1.15
18" O.C.	15.60"	0.51
24" O.C.	20.80"	0.29
36" O.C.	30.00"	0.12

SEE GROUND COVER PLANT KEY FOR MAXIMUM TRIANGULAR SPACING 'A'. THIS CHART IS TO BE USED TO DETERMINE NUMBER OF GROUND COVER PLANTS REQUIRED IN A GIVEN AREA.



CITY OF VALLEJO STANDARD DETAIL

**GROUND COVER
PLANTING DETAIL**

APPROVED BY:

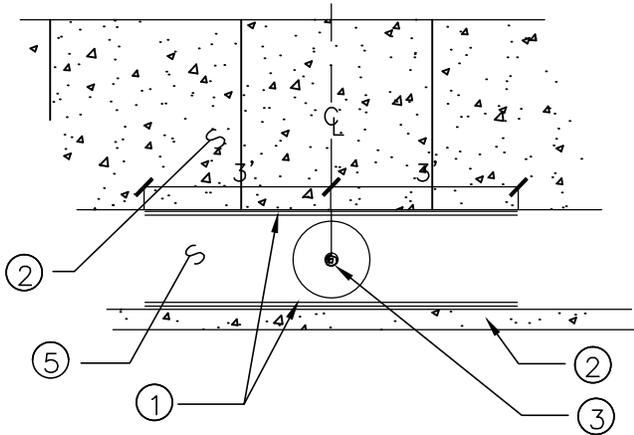
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

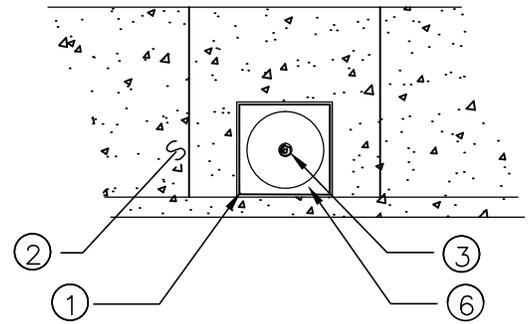
5-34

SCALE:
NONE

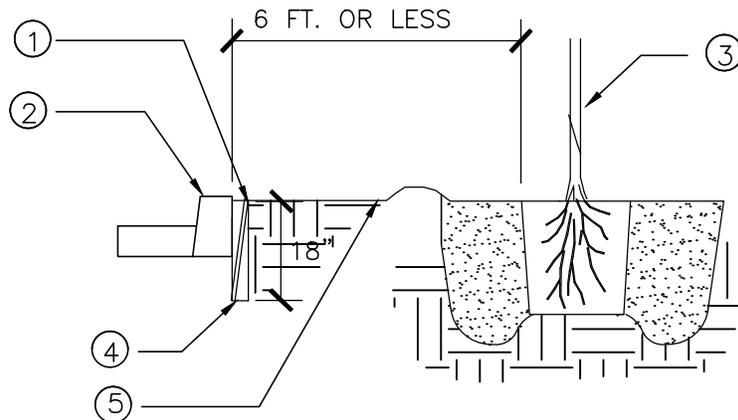
DATE:
7/1/15



EXTEND BARRIER 3 FT. BEYOND
CENTER OF TRUNK EACH WAY
MONOLITHIC CURB AND SIDEWALK



INSTALL ROOT BARRIER IN ONE
CONTINUOUS LENGTH WITHIN TREE WELL
MONOLITHIC CURB AND SIDEWALK



ELEVATION

1. 18" DEEP PLASTIC ROOT BARRIER WITH RIB SIDING. INSTALL AT EDGE OF HARDSCAPE IN TRENCH AT SLIGHT ANGLE. TOP OF BARRIER TO BE FLUSH WITH FINISH GRADE
2. HARDSCAPE SURFACE – SIDEWALK/CURB/DRIVEWAY
3. TREE TRUNK
4. TRENCH
5. PLANTING AREA
6. TREE WELL

ROOT SOLUTIONS ROOT GUIDE/BARRIER PANEL
AVAILABLE FROM: VESPRO (800) 554-0914



CITY OF VALLEJO STANDARD DETAIL

ROOT BARRIER DETAIL

APPROVED BY:

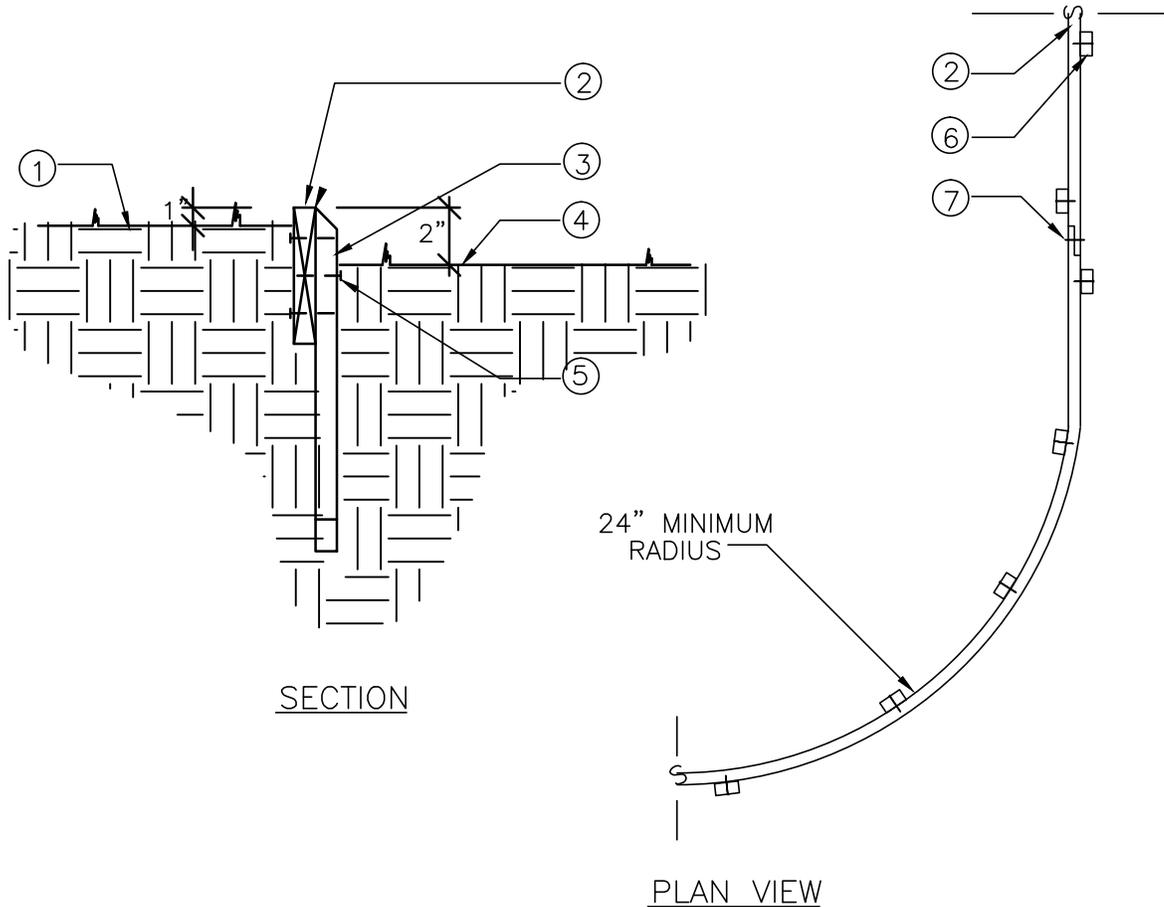
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-35

SCALE:
NONE

DATE:
7/1/15



1. LAWN AREA
2. RECYCLED PLASTIC 2" X 4" HEADERBOARD
3. 1" x 2" x 12" RECYCLED PLASTIC STAKE
4. SHRUB AREA
5. 1-1/4" PLATED DECK SCREWS OR APPROVED EQUAL
6. SPACE STAKES 4' TO 5' O.C. AT STRAIGHT SECTIONS, 3' O.C. AT CURVES
7. SPLICE JOINT WITH 2" OVERLAP ON EACH BOARD EQUALLY. LEAVE 3/8" TO 1/2" GAPS BETWEEN ENDS OF BOARDS TO ALLOW FOR THERMAL EXPANSION



CITY OF VALLEJO STANDARD DETAIL

HEADERBOARD DETAIL

APPROVED BY:

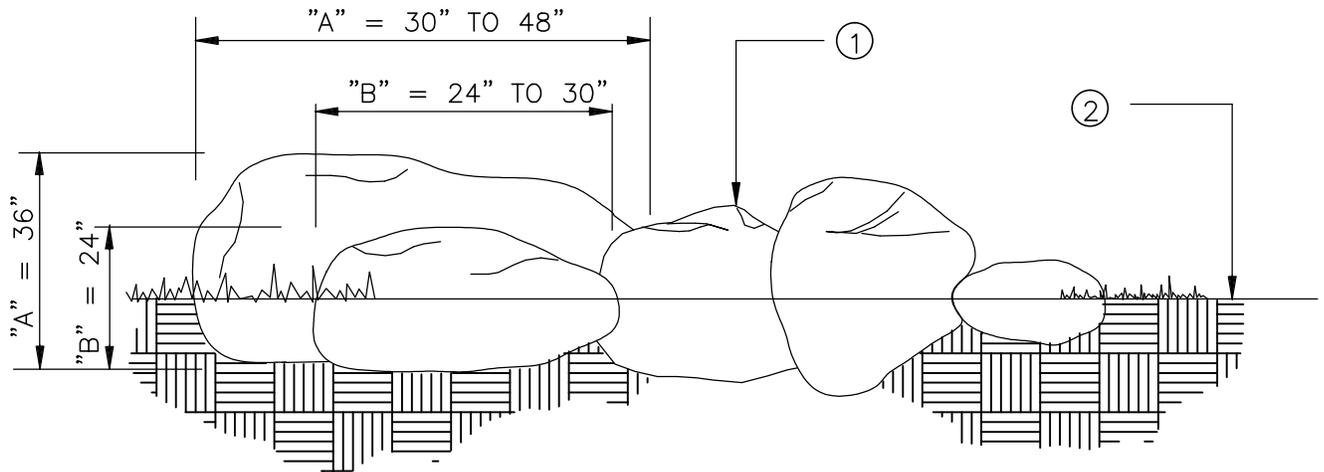
A blue ink signature of the Director of Public Works.

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
5-36

SCALE:
NONE

DATE:
7/1/15



1. LOCAL BOULDERS
2. FINISH GRADE

BOULDERS ARE SHOWN DIAGRAMMATICALLY ON THE PLANTING PLAN AND SHALL BE INSTALLED ACCORDING TO THE SIZE AS SHOWN ON THE LANDSCAPE PLAN.

BOULDERS SHALL BE BURIED $\frac{1}{3}$ TO $\frac{1}{2}$ ITS HEIGHT BELOW FINISH GRADE AS SHOWN. INSTALL WEATHERED AND MOSS SIDES EXPOSED TO ACHIEVE A PERMANENT, NATURAL LAYOUT.

DO NOT INSTALL BOULDERS IN ANY MANNER WHICH WILL BLOCK OR INTERFERE WITH DRAINAGE SWALES OR PIPES OR OTHER UTILITIES.



CITY OF VALLEJO STANDARD DETAIL

**BOULDER
INSTALLATION DETAIL**

APPROVED BY:

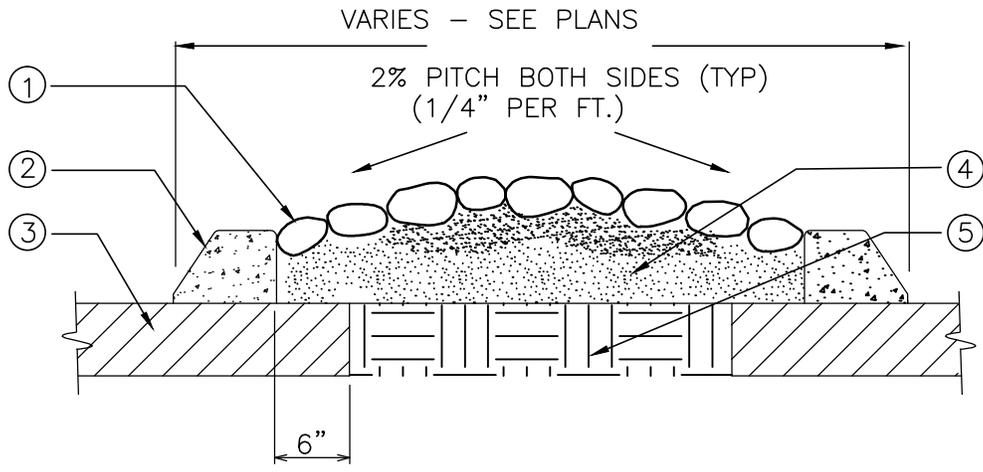
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

5-37

SCALE:
NONE

DATE:
7/1/15



SECTION

1. SET 4" -8" DIAMETER WATER-WORN STONE ("LODI" OR APPROVED EQUAL) INTO MORTAR 2/3 THEIR THICKNESS, PLACES IN A HORIZONTAL ORIENTATION SET COBBLE IN A NEAT AND CLEAN MANNER WITH MINIMUM MORTAR PROTRUSION
2. B3-6 CURB (TYPICAL)
3. EXISTING A.C. PAVEMENT
4. 6" THICK CONCRETE PEA GRAVEL MORTAR BED
5. 95% COMPACTED SUBMERGED OR EXISTING A.C. PAVEMENT

AFTER THE COBBLESTONE HAS BEEN SET INTO THE MORTAR, THE EXCESS MORTAR IN BETWEEN THE JOINTS OF THE COBBLESTONES SHALL BE CAREFULLY REMOVED AND RAKED IN A SMOOTH JOINT. (MINIMUM PROTRUSION OF MORTAR WILL BE ALLOWED.) ENGINEER OR LANDSCAPE INSPECTOR APPROVAL OF STONES REQUIRED PRIOR TO INSTALLATION



CITY OF VALLEJO STANDARD DETAIL

COBBLE DETAIL

APPROVED BY:

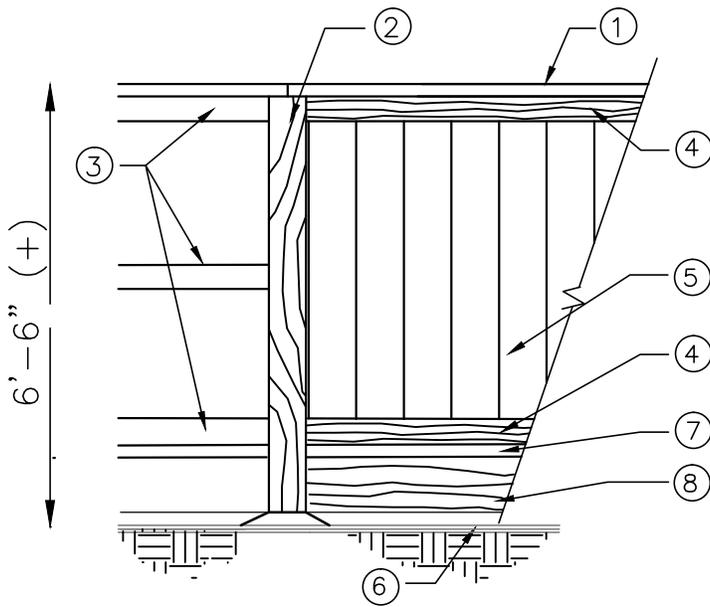
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

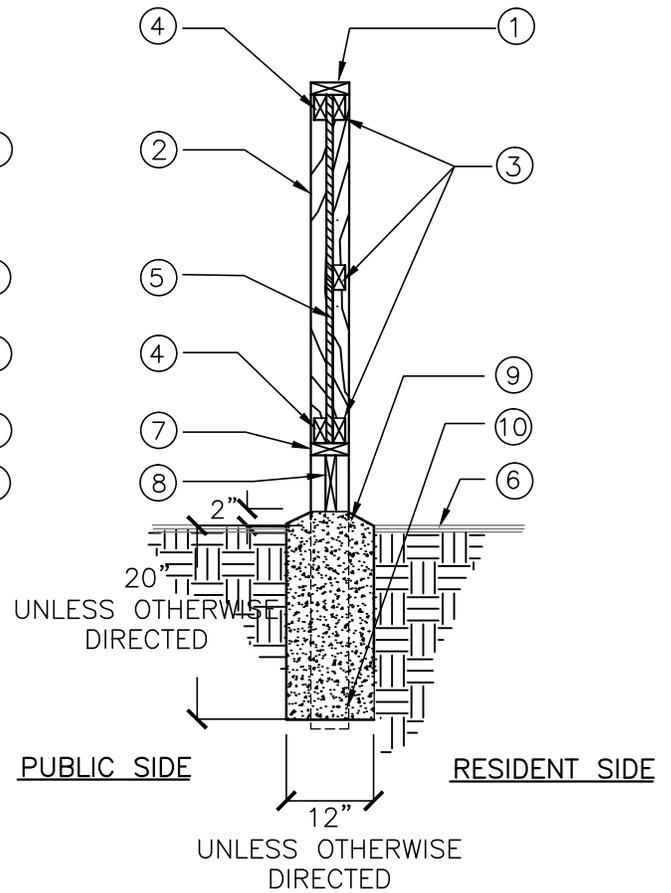
5-38

SCALE:
NONE

DATE:
7/1/15



ELEVATION



SECTION

1. 2 x 6 TOP RAIL – SPLICE AT POST
2. 4 x 6 PRESSURE TREATED WOOD POST SET POST 8' O.C. (TYP)
3. 2 x 4 FRAME, BACKSIDE
4. 2 x 4 TRIM, FRONT SIDE
5. 1 x 8 FENCE BOARDS
6. FINISHED GRADE
7. 2 x 6 BOTTOM RAIL
8. 2 x 6 PRESSURE TREATED KICK BOARD INSTALL 1" MINIMUM ABOVE FINISH GRADE
9. CONCRETE FOOTING – CROWN TOP TWO INCHES ABOVE FINISHED GRADE TROWEL AND SLOPE AWAY FROM POST
10. EXTEND POST THROUGH CONCRETE FOOTING

NOTES:

- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
- EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
- CONCRETE SHALL BE TRANSIT MIX OR WET MIX – NO DRY SET
- CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO EXISTING FACILITIES.



CITY OF VALLEJO STANDARD DETAIL

PUBLIC FENCE DETAIL

APPROVED BY:

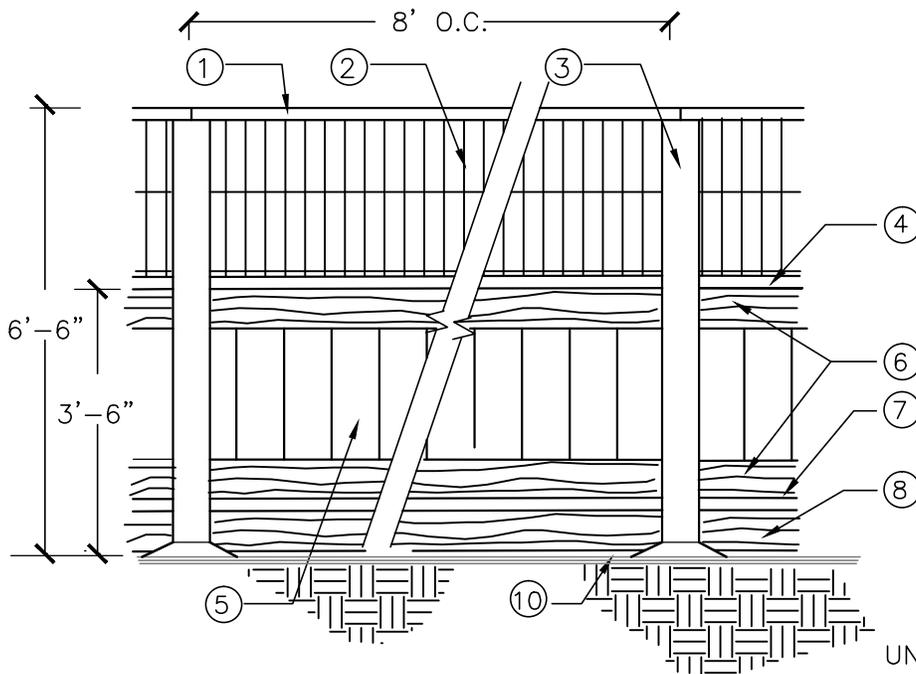
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

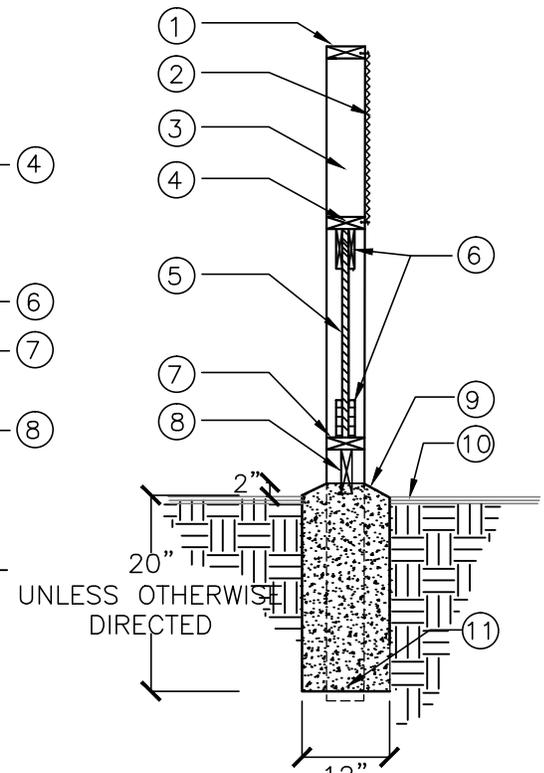
6-01

SCALE:
NONE

DATE:
7/1/15



ELEVATION



UNLESS OTHERWISE DIRECTED

UNLESS OTHERWISE DIRECTED

SECTION

1. 2 x 4 CAP – SPLICE AT POST
2. 2 x 4 GALV. WW FENCE STRETCH AND STAPLE TO BACK OF FENCE
3. 4 x 6 PRESSURE TREATED POST – SET POST 8’ O.C.
4. 2 x 4 MIDDLE RAIL
5. 1 x 8 FENCE BOARDS
6. 1 x 6 TRIM, BOTH SIDES
7. 2 x 4 BOTTOM RAIL
8. 2 x 6 PRESSURE TREATED KICK BOARD INSTALL 1” MINIMUM ABOVE FINISH GRADE
9. CONCRETE FOOTING – CROWN TOP TWO INCHES ABOVE FINISHED GRADE TROWEL AND SLOPE AWAY FROM POST
10. FINISHED GRADE
11. EXTEND POST THROUGH CONCRETE FOOTING

NOTES:

- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
- EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
- CONCRETE SHALL BE TRANSIT MIX OR WET MIX – NO DRY SET
- CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO EXISTING FACILITIES.



CITY OF VALLEJO STANDARD DETAIL

**WOOD AND WIRE
FENCE DETAIL**

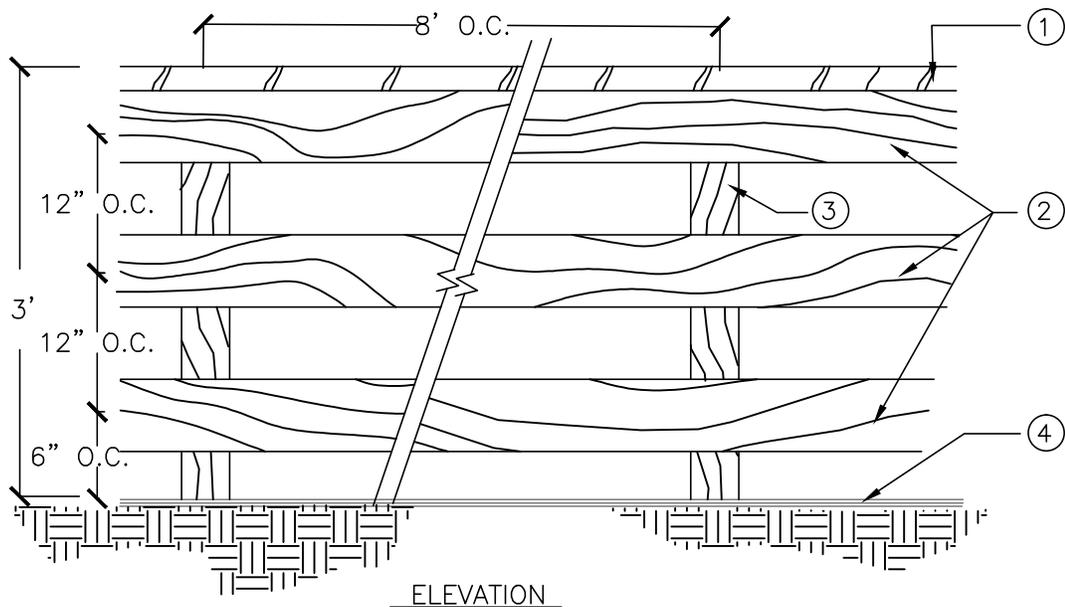
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-02

SCALE:
NONE

DATE:
7/1/15

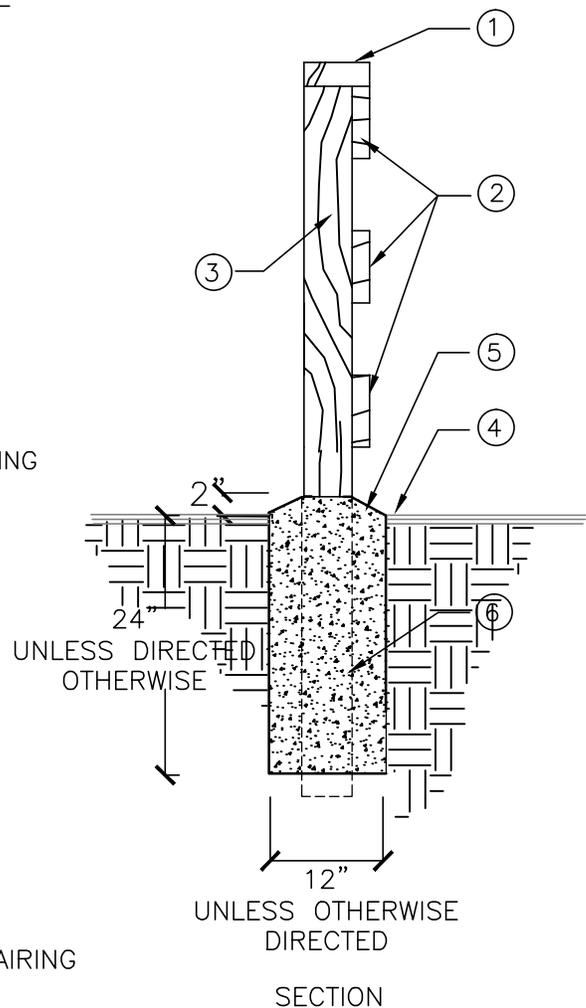


ELEVATION

1. 2 x 6 CAP
2. 2 x 6 RAILS
3. 4 x 6 POST
4. FINISHED GRADE
5. CONCRETE FOOTING – CROWN TOP TWO INCHES ABOVE FINISHED GRADE TROWEL AND SLOPE AWAY FROM POST
6. EXTEND POST THROUGH CONCRETE FOOTING

NOTES:

- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
- EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
- CONCRETE SHALL BE TRANSIT MIX OR WET MIX NO DRY SET
- CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING REPAIRING DAMAGE TO EXISTING FACILITIES.



SECTION



CITY OF VALLEJO STANDARD DETAIL

OPEN RAIL
FENCE DETAIL

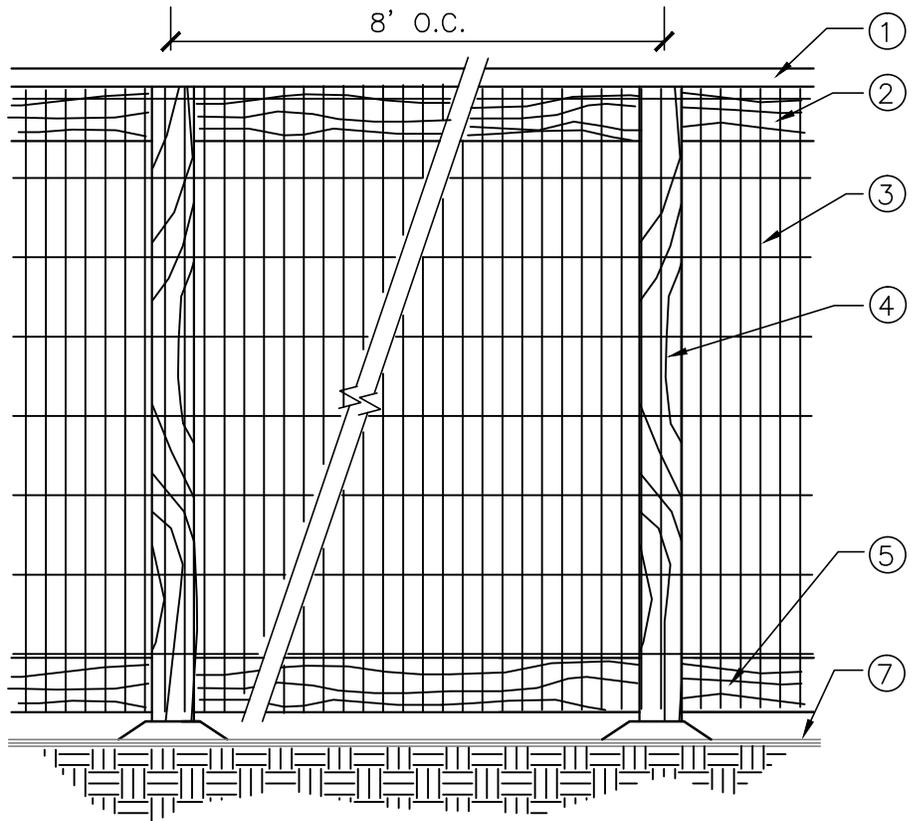
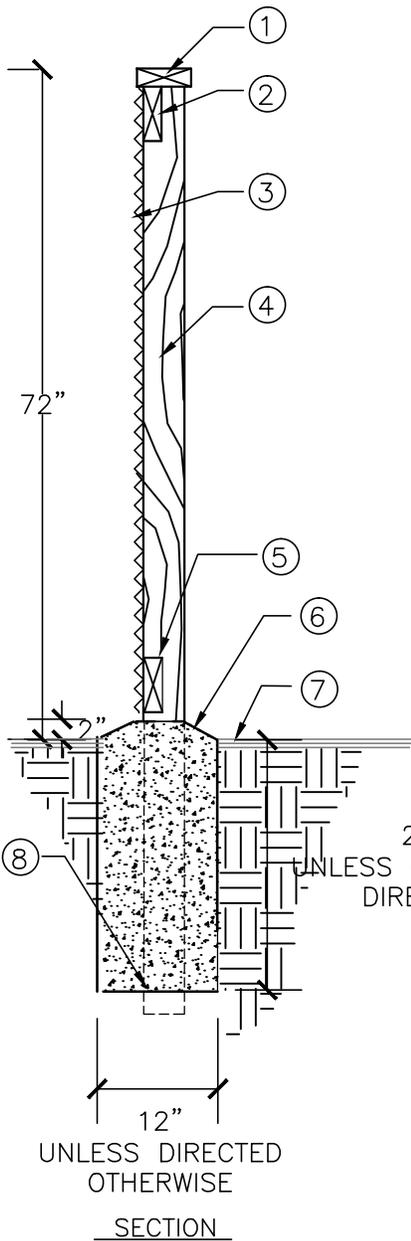
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-03

SCALE:
NONE

DATE:
7/1/15



20"
UNLESS OTHERWISE
DIRECTED

UNLESS DIRECTED
OTHERWISE
SECTION

1. 2 x 6 CAP
2. 2 x 6 TOP RAIL
3. 2" x 4" GALV. WW FENCE STRETCH AND STAPLE TO FRONT OF FENCE
4. 4 x 4 PRESSURE TREATED POST SET POST 8' O.C.
5. 2 x 6 BOTTOM RAIL
6. CONCRETE FOOTING – CROWN TWO INCHES ABOVE FINISHED GRADE TROWEL AND SLOPE AWAY FROM POST
7. FINISHED GRADE
8. EXTEND POST THROUGH CONCRETE FOOTING

- NOTES:
- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
 - EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
 - CONCRETE SHALL BE TRANSIT MIX OR WET MIX – NO DRY SET
 - CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
 - CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO EXISTING FACILITIES.



CITY OF VALLEJO STANDARD DETAIL

**WIRE FENCE WITH
4 x 4 POST DETAIL**

APPROVED BY:

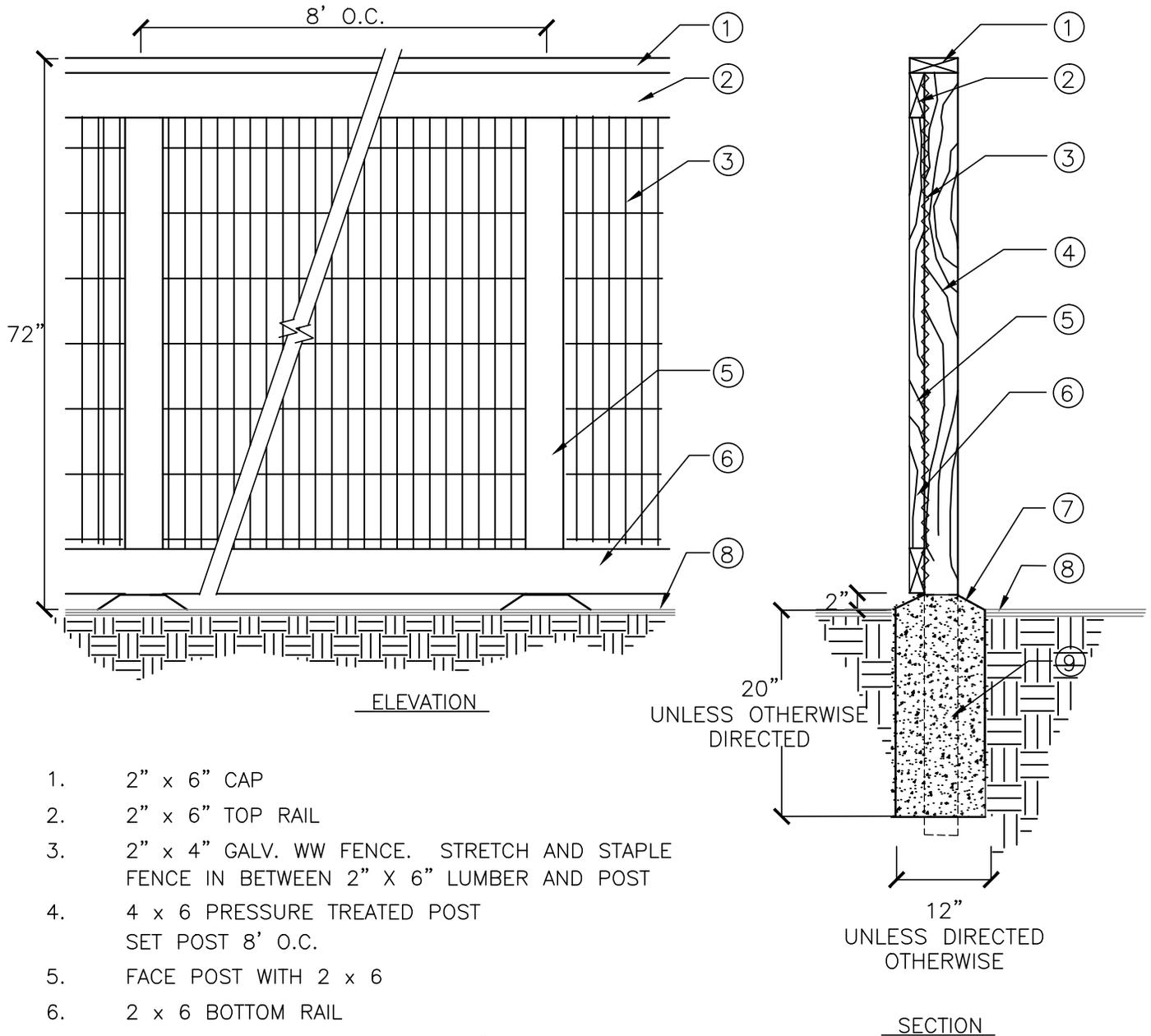


DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-04

SCALE:
NONE

DATE:
7/1/15



1. 2" x 6" CAP
2. 2" x 6" TOP RAIL
3. 2" x 4" GALV. WW FENCE. STRETCH AND STAPLE FENCE IN BETWEEN 2" X 6" LUMBER AND POST
4. 4 x 6 PRESSURE TREATED POST SET POST 8' O.C.
5. FACE POST WITH 2 x 6
6. 2 x 6 BOTTOM RAIL
7. CONCRETE FOOTING – CROWN 2" ABOVE FINISH GRADE, TROWEL AND SLOPE AWAY FROM POST
8. FINISHED GRADE
9. EXTEND POST THROUGH CONCRETE FOOTING

NOTES:

- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
- EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
- CONCRETE SHALL BE TRANSIT MIX OR WET MIX – NO DRY SET
- CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO EXISTING FACILITIES.



CITY OF VALLEJO STANDARD DETAIL

**WIRE FENCE WITH
4 x 6 POST DETAIL**

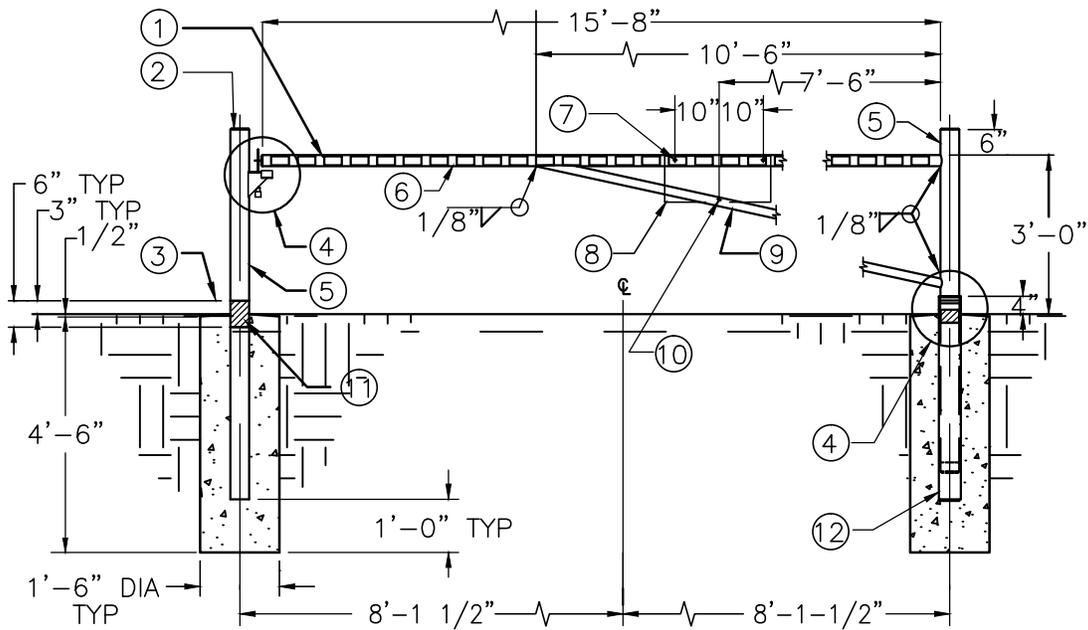
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-05

SCALE:
NONE

DATE:
7/1/15



TYPE 1 INSTALLATION

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. 2" x 4" STRIPS OF RED REFLECTING PAINT. "COD-IT" @ 6" O.C. BOTH SIDES 2. WELD 4-1/4" Ø x 3/16" PL TO END OF PIPE (TYP FOR BOTH SIDES OF PIPES) 3. PROJECT ASPHALT GROUND & SLOPE ALL AROUND (TYP) 4. SEE DETAIL 6-08 5. 4" SCH. 80 6. 2-1/2" SCH. 40 7. DRILL 2-1/2" Ø HOLES FOR 3/8" BOLTS. PEEN THREADED ENDS AFTER INSTALLATION TYP 2 PLACES | <ol style="list-style-type: none"> 8. TRACE OF 9" x 24" SIGN FACE OUTWARD SEE NOTE 4 DETAIL 6-03 9. 2" SCH. 40 10. DRILL 3/8" Ø HOLE FOR 1/4" BOLT. PEEN THREADED END AFTER INSTALLATION 11. SPIRAL WRAP WITH PVC ELECTRICAL TAPE, TYP LAP EDGES 1/2" 12. 5" SCH. 80, POUR IN 1 GAL. HEAVY OIL BEFORE INSERTING 4" PIPE (SEE DETAIL 6-08) 13. WELD 2 1/4" Ø x 3/16" PL TO END OF PIPE |
|--|--|



CITY OF VALLEJO STANDARD DETAIL

**TYPE 1
PIPE BARRIER GATE**

APPROVED BY:

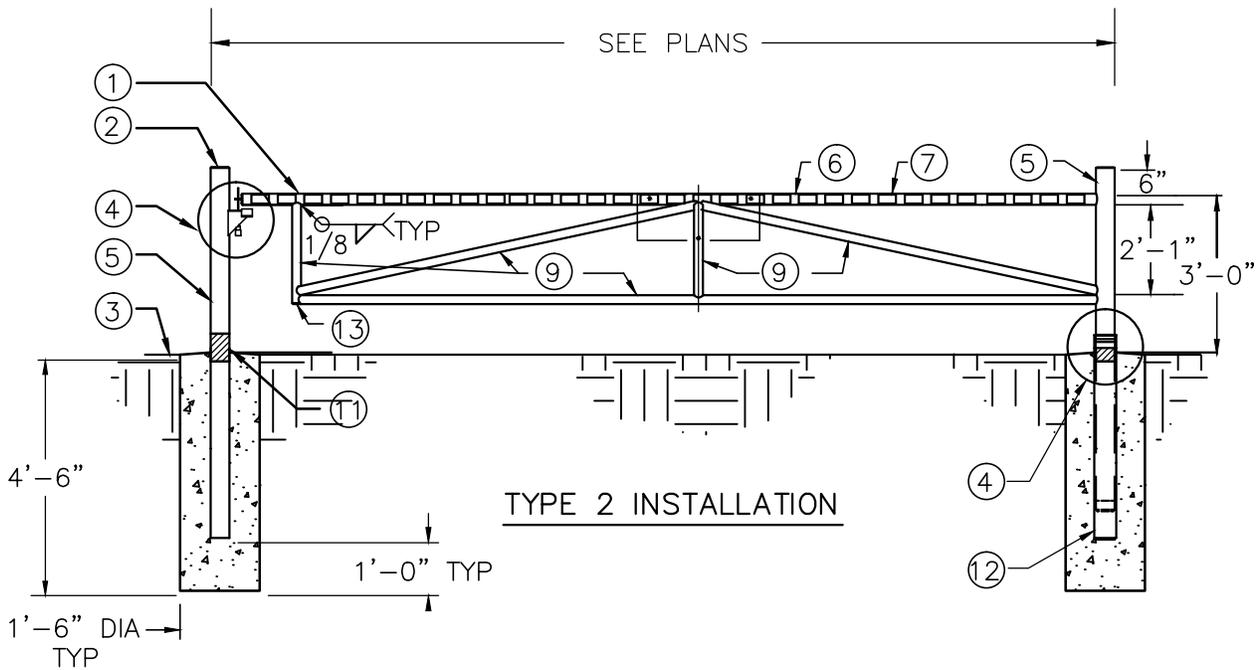
[Signature]

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-06

SCALE:
NONE

DATE:
7/1/15



- | | |
|--|--|
| <ol style="list-style-type: none"> 1. 2" x 4" STRIPS OF RED REFLECTING PAINT. "COD-IT" @ 6" O.C. BOTH SIDES 2. WELD 4-1/4" Ø x 3/16" PL TO END OF PIPE (TYP FOR BOTH SIDES OF PIPES) 3. PROJECT ASPHALT GROUND & SLOPE ALL AROUND (TYP) 4. SEE DETAIL 6-08 5. 4" SCH. 80 6. 2-1/2" SCH. 40 7. DRILL 2-1/2" Ø HOLES FOR 3/8" BOLTS. PEEN THREADED ENDS AFTER INSTALLATION TYP 2 PLACES | <ol style="list-style-type: none"> 8. TRACE OF 9" x 24" SIGN FACE OUTWARD SEE NOTE 4 DETAIL 6-03 9. 2" SCH. 40 10. DRILL 3/8" Ø HOLE FOR 1/4" BOLT. PEEN THREADED END AFTER INSTALLATION 11. SPIRAL WRAP WITH PVC ELECTRICAL TAPE, TYP LAP EDGES 1/2" 12. 5" SCH. 80, POUR IN 1 GAL. HEAVY OIL BEFORE INSERTING 4" PIPE (SEE DETAIL 6-08) 13. WELD 2 1/4" Ø x 3/16" PL TO END OF PIPE |
|--|--|

EXCEPT AS SHOWN, TYPE 1 AND TYPE 2 BARRIER GATES ARE SIMILAR SEE DETAIL 606



CITY OF VALLEJO STANDARD DETAIL

**TYPE 2
PIPE BARRIER GATE**

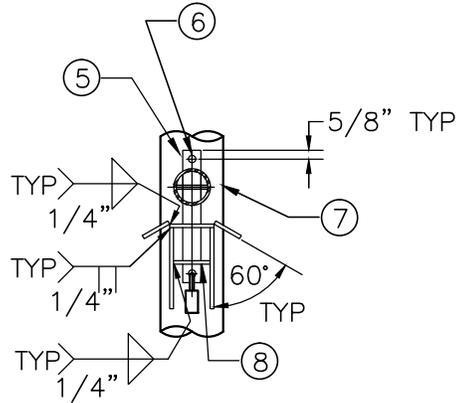
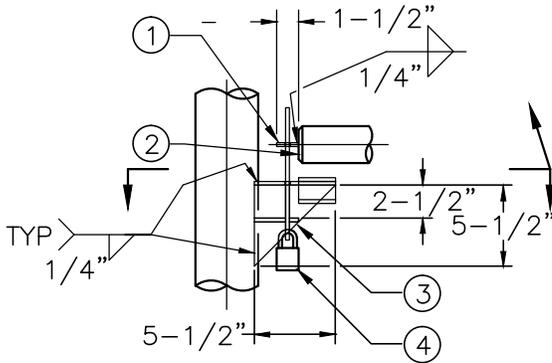
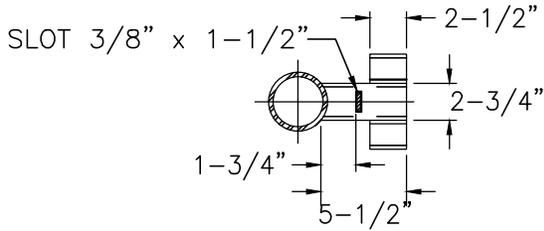
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

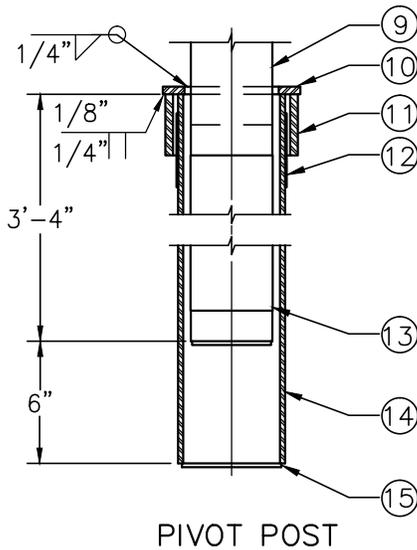
DRAWING NO:
6-07

SCALE:
NONE

DATE:
7/1/15



LATCH/LOCK



1. BAR 1-1/2" x 1/4" WITH 3/8" x 1-1/2" SLOT
2. WELD 2-3/4" Ø x 3/16" PL @ END OF PIPE
3. BAR 1/4", TYP
4. PADLOCK DISTRICT FURNISHED
5. BAR 1-1/4" x 1/4" x 9"
6. 1/2" Ø HOLE, TYP. PROVIDE 3/8" x 1" BOLT AND NUT WHEN 1 LOCK ONLY IS USED. PEEN THREADED END AFTER INSTALLATION
7. BAR 2" x 1/4" x 2-1/2", TYP.
8. BAR 2-1/4" x 1/4" x 2-1/2" WITH 1-1/2" x 3/8" SLOT
9. 4" SCH 80 x 6'-6"
10. PL 6-3/4" O.D x 4-5/8" I.D. x 3/8"
11. 6" SCH 40 x 3"
12. SPIRAL WRAP
13. ROLL 12 GA. x 1-1/2" WIDE RING. TACK WELD TO POST
14. 5" SCH 80 x 3'-10"
15. WELD 5-1/4" Ø x 3/16" PL TO END OF PIPE

GATE NOT SHOWN (SEE DETAILS 6-06, 6-07)



CITY OF VALLEJO STANDARD DETAIL

**PIPE BARRIER GATES
LATCH/LOCK AND
PIVOT POST DETAILS**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
6-08

SCALE:
NONE

DATE:
7/1/15

LIST OF MATERIALS

NO. REQ'D	DESCRIPTION
2'-10"	12 GA. x 1-1/2" SHEET STEEL, BLACK
1	BAR 1-1/4" x 1/4" x 9"
1	BAR 1-1/2" x 1/4" x 2-3/4"
2	BAR 2" x 1/4" x 2-1/2"
1	BAR 2-3/4" x 1/4" x 5-1/2"
1	BAR 5-1/2" x 1/4" x 5-1/2", CUT DIAGONALLY
1	BAR 2-1/4" x 1/4" x 2-1/2"
1	1/4" DIA. x 3-1/2" BOLT WITH NUT
2	3/8" DIA. x 3-3/4" BOLT WITH NUTS
1	3/8" DIA. x 1" BOLT WITH NUT (WHEN 1 LOCK ONLY IS USED)
1	9" x 24" SIGN, SEE G.N. 4
1	DISTRICT PADLOCK
15± C.F.	CONCRETE
AS NEC	PVC ELECTRICAL TAPE, 2" WIDE, 7 MILS MINIMUM THICKNESS
1	6-3/4" x 3/8" x 6-3/4" PLATE, CUT TO SHAPE
1	2-1/4" DIA x 3/16" PLATE (TYPE2)
1	2-3/4" DIA x 3/16" PLATE
3	4-1/4" DIA x 3/16" PLATE
1	5-1/4" DIA x 3/16" PLATE
1 GAL.	HEAVY OIL
AS NEC.	RED REFLECTING PAINT
AS NEC.	SHERWOOD GREEN PAINT
11'-2"	2" SCH.40 STEEL PIPE, BLACK (TYPE1)
34'-9"	2" SCH.40 STEEL PIPE (TYPE2)
15'-9"	2-1/2" SCH.40 STEEL PIPE, BLACK
13'-6"	4" SCH.80 STEEL PIPE, BLACK
3"	6" SCH.40 STEEL PIPE, BLACK

GENERAL NOTES:

1. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 P.S.I. AT 28 DAYS.
2. ALL WELDS SHALL BE GROUND FLUSH AND SMOOTH.
3. HOT-DIP GALVANIZE AFTER FABRICATION.
4. SIGN SHALL BE FURNISHED BY DISTRICT. SEE SIGN DETAILS OF DRAWING NO. 5-XX.
5. GATES MUST HAVE A MINIMUM OF 14' CLEAR OPENING.



CITY OF VALLEJO STANDARD DETAIL

**PIPE BARRIER GATE
LIST OF MATERIALS**

APPROVED BY:

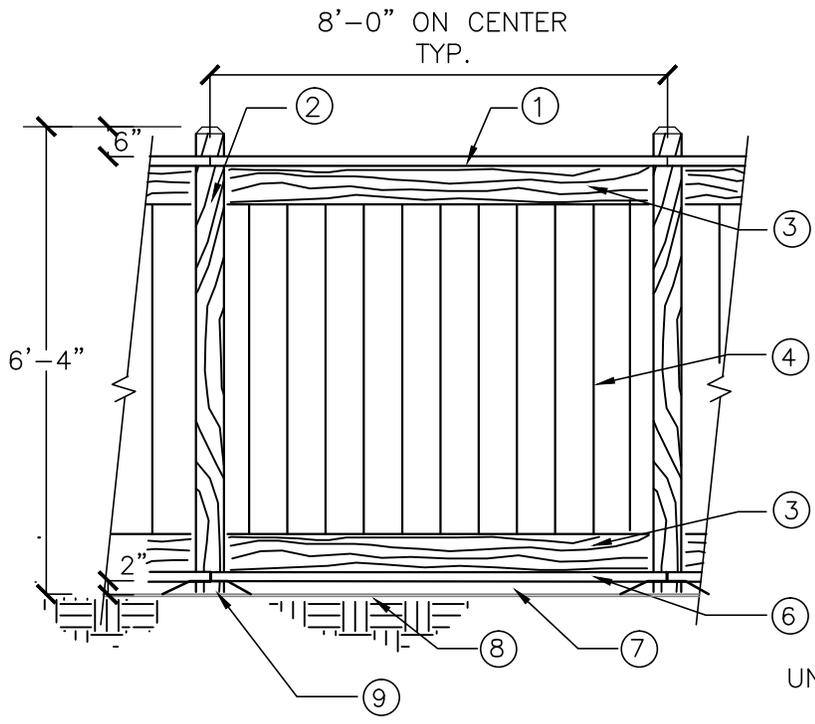
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

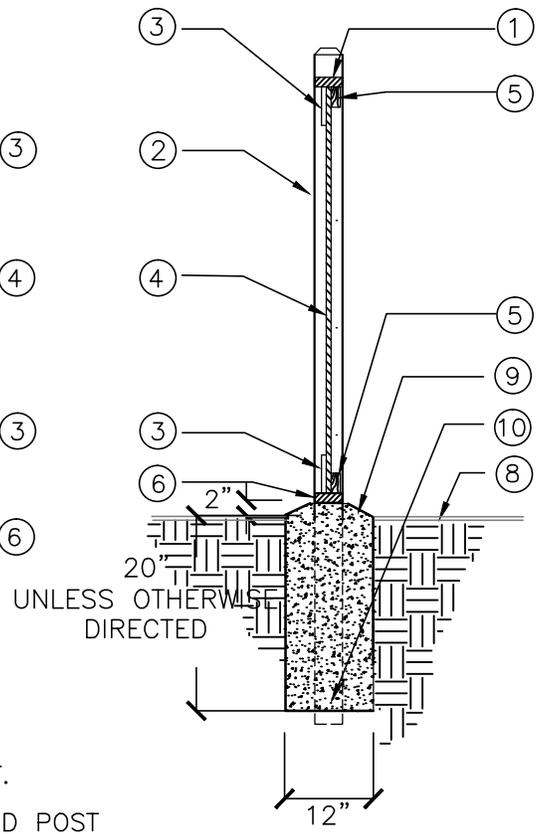
6-09

SCALE:
NONE

DATE:
7/1/15



ELEVATION



SECTION

1. 2 x 6 TOP RAIL – NOTCH OUT POST TO FIT.
2. 6" DIA. PRESSURE TREATED DOUGLAS FIRWOOD POST WITH 1" BEVELED TOP SET POST 8' O.C. (TYP)
3. 1 x 8 TRIM BOARD, EASEMENT SIDE ONLY
4. 1 x 8 SIDING
5. 2 x 4 TRIM BOARD ON RESIDENTIAL SIDE ONLY
6. 2 x 6 BOTTOM RAIL, NOTCH OUT POST TO FIT.
7. 2" OPENING BETWEEN BOTTOM RAIL AND GRADE
8. FINISHED GRADE
9. CONCRETE FOOTING – CROWN TOP TWO INCHES ABOVE FINISHED GRADE TROWEL AND SLOPE AWAY FROM POST
10. EXTEND POST THROUGH CONCRETE FOOTING

NOTES:

- ALL LUMBER UNLESS OTHER WISE NOTED SHALL BE CONSTRUCTION GRADE REDWOOD.
- EVERCOAT SCREW FASTENERS; DECK MATE by PHILLIPS FASTENER PRODUCTS, OR EQUAL.
- CONCRETE SHALL BE TRANSIT MIX OR WET MIX – NO DRY SET
- CONTRACTOR SHALL OFF-HAUL ALL MATERIAL, INCLUDING POST HOLE DIGGINGS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING DAMAGE TO EXISTING FACILITIES.

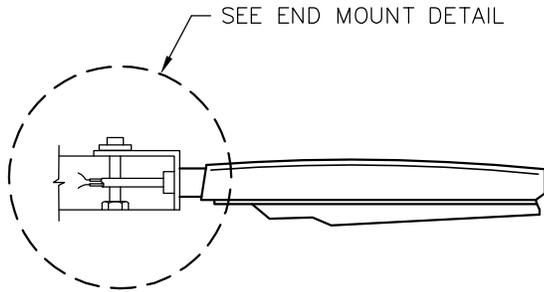


CITY OF VALLEJO STANDARD DETAIL
PUBLIC FENCE DETAIL #2

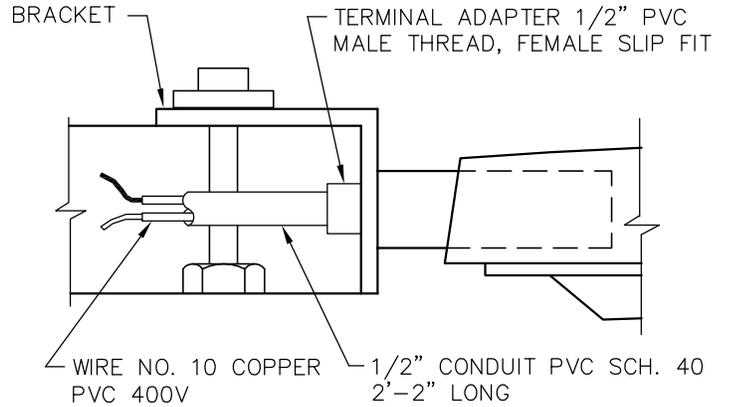
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

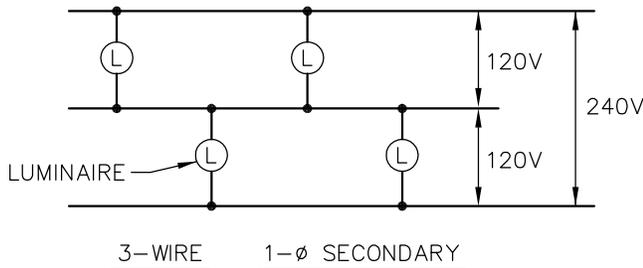
DRAWING NO:
6-10
SCALE:
NONE
DATE:
7/1/15



**MAST ARM MOUNTED
LUMINAIRE**



END MOUNT DETAIL



WIRING SCHEMATIC

TABLE A

STREET LIGHT FUSE SIZE	
LAMP RATING WATTS	FUSE RATINGS AMPERES
70	5
100	5
150	5
175	5
200	5
250	10

NOTE: WHEN INSTALLING HIGH PRESSURE SODIUM LUMINAIRES, IT IS DESIRABLE THAT THE OPERATING VOLTAGE BE 120V. BALANCE TRANSFORMER SECONDARY LOADING BY CONNECTING LUMINAIRES AS SHOWN.

1. FUSES SHALL BE INLINE TYPE.
2. FUSES SHALL BE LOCATED IN PULL BOX ADJACENT TO LIGHT POLE.
3. EACH LUMINAIRE SHALL BE FUSED SEPARATELY.

GENERAL NOTES

1. ALL LUMINAIRES SHALL BE 120V HIGH PRESSURE SODIUM VAPOR LUMINAIRES.
2. PHOTOELECTRIC CONTROL SHALL BE WEATHERPROOF DUAL VOLTAGE PHOTOELECTRIC RELAY WITH TWIST LOCK RECEPTACLE INTEGRAL WITH LUMINAIRES.
3. BALLAST SHALL BE REGULATOR TYPE WITH 90% POWER FACTOR PER SECTION 86.-6.10A, CALTRANS STANDARD SPECIFICATIONS.
4. LIGHT CONTROL SHALL BE SEMI-CUTOFF, VERTICAL LIGHT DISTRIBUTION PATTERN SHALL BE MEDIUM, AND TRANSVERSE LIGHT DISTRIBUTION PATTERN SHALL BE PER PLANS.
5. ALL LUMINAIRES SHALL HAVE OPTICAL FILTER SYSTEMS.
6. CONTRACTOR TO PROVIDE CITY WITH MATERIAL SUBMITTED 10 DAYS PRIOR TO INSTALLATION FOR APPROVAL.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
STREET LIGHT LUMINAIRE**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

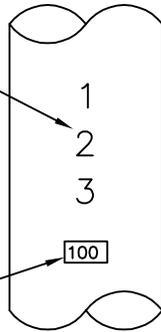
DRAWING NO:

7-01

SCALE:
NONE

DATE:
09/13/11

CONTRACTOR TO PROVIDE
& INSTALL 3" HIGH
(NUMBERING SEQUENCE
PROVIDED BY PG&E)

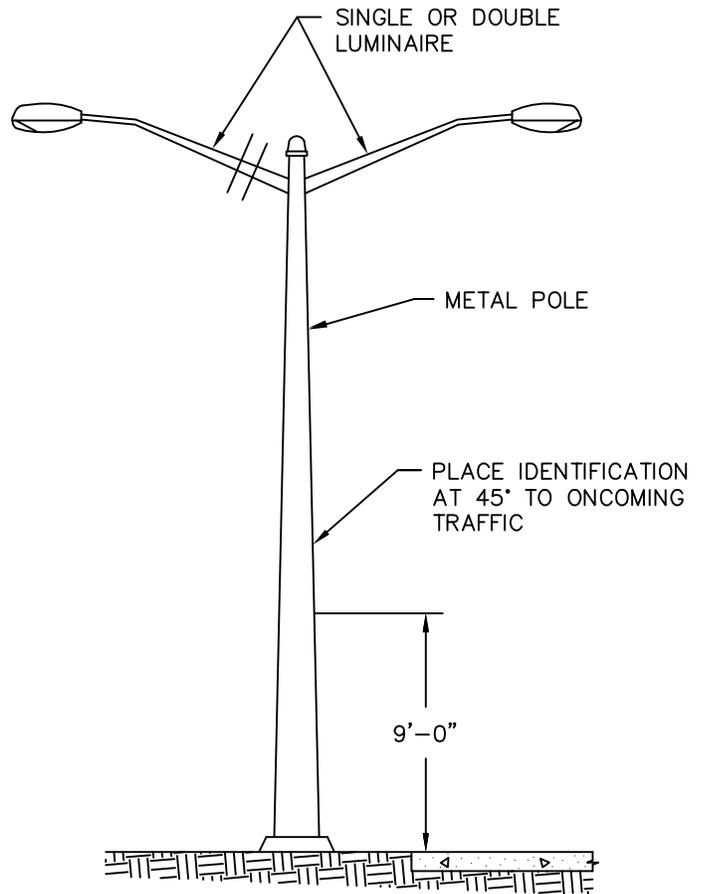


LAMP IDENT. NUMBER
(SEE NOTE 4)

ARRANGEMENT OF
NUMBERS ON THE POLE

TABLE A

LAMP IDENTIFICATION TAGS HIGH PRESSURE SODIUM LAMP	
TAG MARKINGS	LAMP RATINGS WATTS
70	70
100	100
150	150
175	175
200	200
250	250



NOTES

1. USE ENAMEL PAINT OR ENAMEL TRANSPARENTS FOR STREET LIGHT NUMBERS ON METAL POLES OR POSTS.
2. TWIN LUMINARIES REQUIRE TWO STREET LIGHT LOCATION NUMBER.
3. USE BLACK IDENTIFICATION NUMBERS ON LIGHT POLES. BACKGROUND COLOR SHALL BE GOLD OR SILVER.
4. USE 3/4" ENAMEL PAINT TRANSFERS OR ENAMEL TRANSPARENTS FOR LAMP IDENTIFICATION NUMBERS ON METAL.
5. STREET LIGHT NUMBERS TO BE IN BLACK LETTERING W/ WHITE HIGH INTENSITY BACKGROUND.

(STREET LIGHT POLE NUMBER SEQUENCE MUST BE OBTAINED FROM PG&E)



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
LIGHT POLE NUMBER**

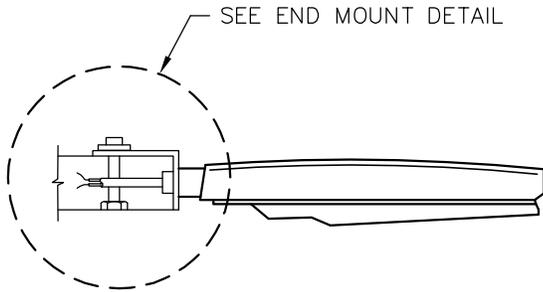
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

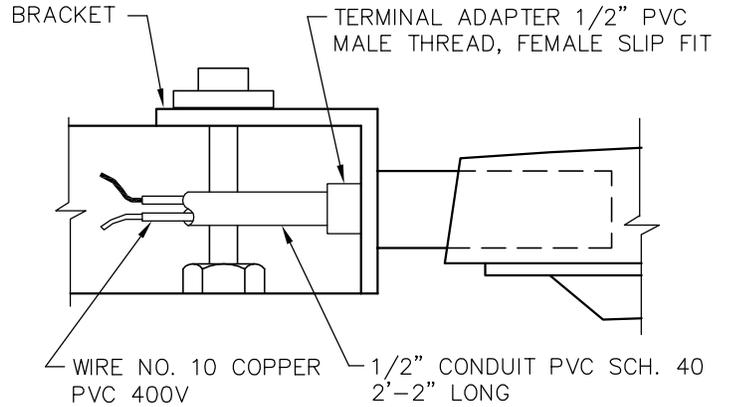
DRAWING NO:
7-02

SCALE:
NONE

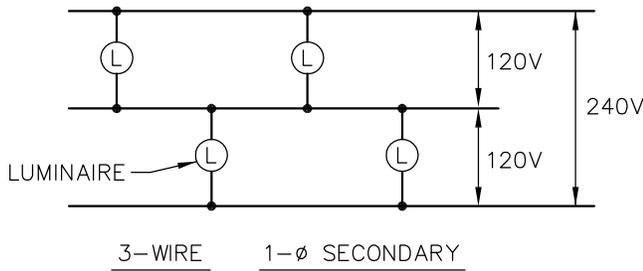
DATE:
09/13/11



MAST ARM MOUNTED LUMINAIRE



END MOUNT DETAIL



WIRING SCHEMATIC

TABLE A

STREET LIGHT FUSE SIZE	
LAMP RATING WATTS	FUSE RATINGS AMPERES
70	5
100	5
150	5
175	5
200	5
250	10

NOTE: WHEN INSTALLING HIGH PRESSURE SODIUM LUMINAIRES, IT IS DESIRABLE THAT THE OPERATING VOLTAGE BE 120V. BALANCE TRANSFORMER SECONDARY LOADING BY CONNECTING LUMINAIRES AS SHOWN.

1. FUSES SHALL BE INLINE TYPE.
2. FUSES SHALL BE LOCATED IN PULL BOX ADJACENT TO LIGHT POLE.
3. EACH LUMINAIRE SHALL BE FUSED SEPARATELY.

GENERAL NOTES

1. ALL LUMINAIRES SHALL BE 120V HIGH PRESSURE SODIUM VAPOR LUMINAIRES.
2. PHOTOELECTRIC CONTROL SHALL BE WEATHERPROOF DUAL VOLTAGE PHOTOELECTRIC RELAY WITH TWIST LOCK RECEPTACLE INTEGRAL WITH LUMINAIRES.
3. BALLAST SHALL BE REGULATOR TYPE WITH 90% POWER FACTOR PER SECTION 86.-6.10A, CALTRANS STANDARD SPECIFICATIONS.
4. LIGHT CONTROL SHALL BE SEMI-CUTOFF, VERTICAL LIGHT DISTRIBUTION PATTERN SHALL BE MEDIUM, AND TRANSVERSE LIGHT DISTRIBUTION PATTERN SHALL BE PER PLANS.
5. ALL LUMINAIRES SHALL HAVE OPTICAL FILTER SYSTEMS.
6. CONTRACTOR TO PROVIDE CITY WITH MATERIAL SUBMITTED 10 DAYS PRIOR TO INSTALLATION FOR APPROVAL.



CITY OF VALLEJO STANDARD DETAIL

STANDARD STREET LIGHT LUMINAIRE

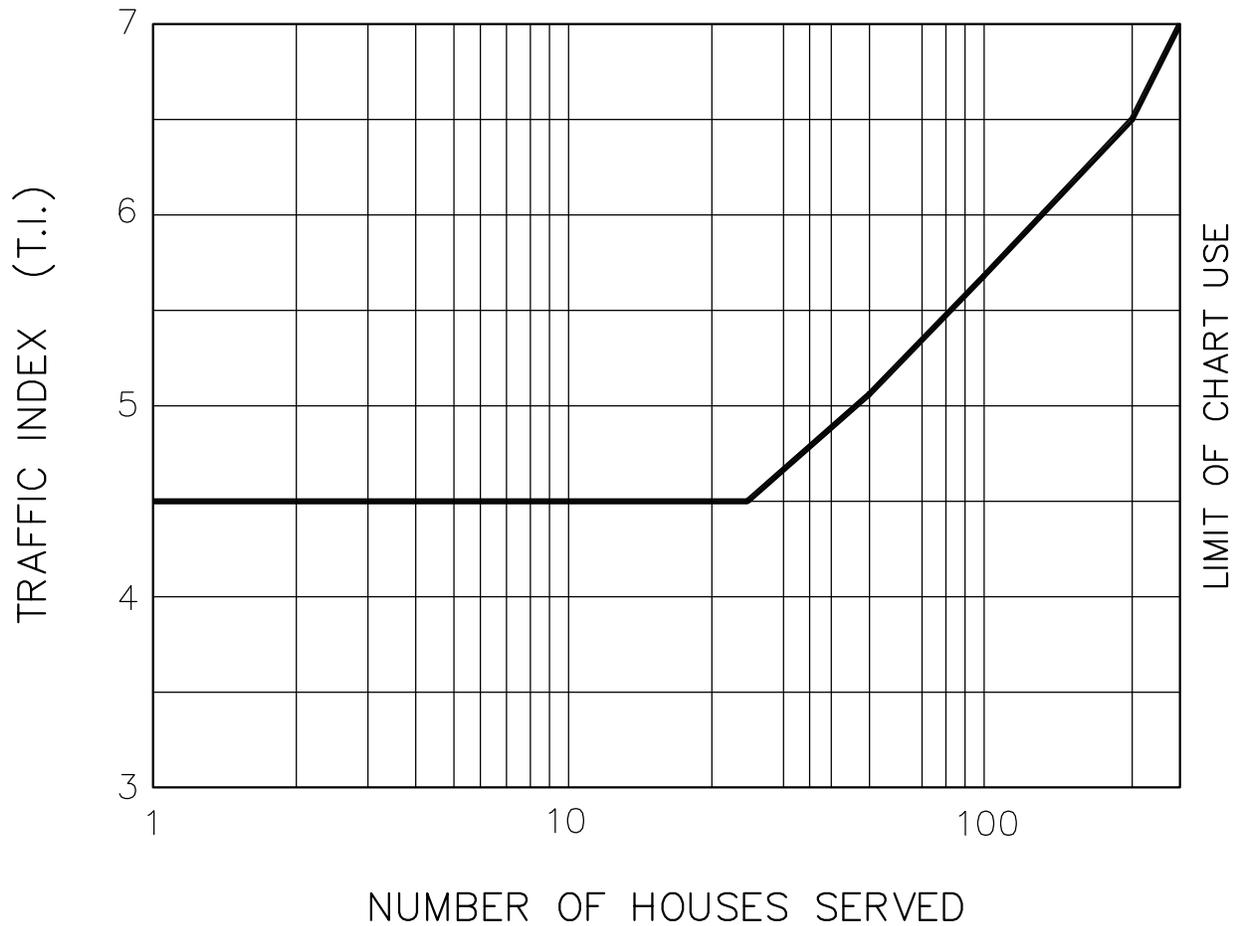
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-03

SCALE:
NONE

DATE:
09/13/11



NOTES

1. FOR USE ONLY WITHIN SUBDIVISIONS FOR RESIDENTIAL AND CUL-DE-SAC STREETS.
2. CHART IS BASED ON A 20-YEAR DESIGN LIFE.
3. T.I. = 2.472 (HOUSES)^{0.1825}



CITY OF VALLEJO STANDARD DETAIL

**STANDARD CHART FOR
ESTIMATION OF TRAFFIC INDEX
USING A HOUSING COUNT**

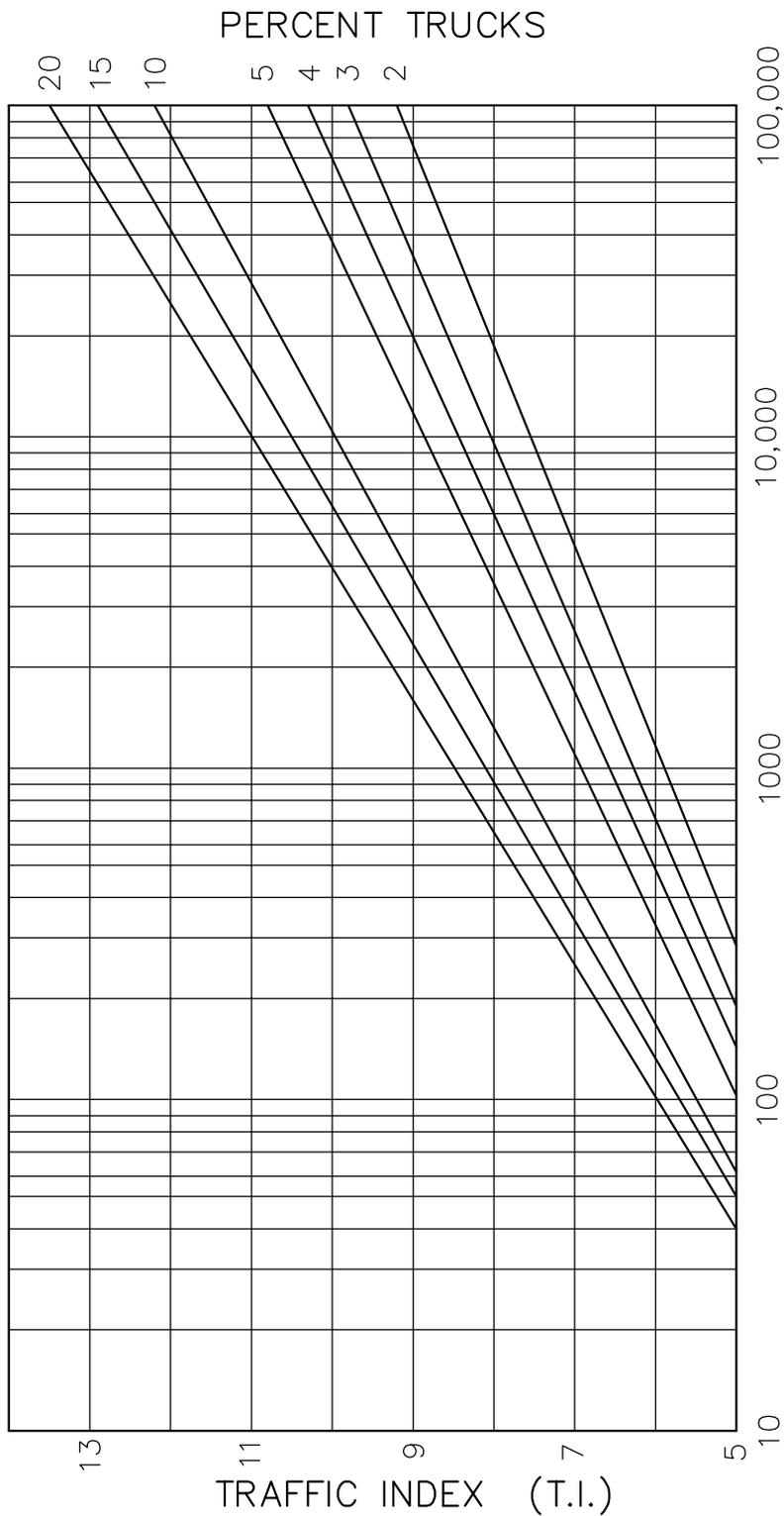
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-04

SCALE:
NONE

DATE:
09/13/11



AVERAGE DAILY TRAFFIC (A.D.T.)
BASED ON 20 YR. DESIGN LIFE



CITY OF VALLEJO STANDARD DETAIL

**STANDARD CONVERSION CHART
AVERAGE DAILY TRAFFIC
TO TRAFFIC INDEX**

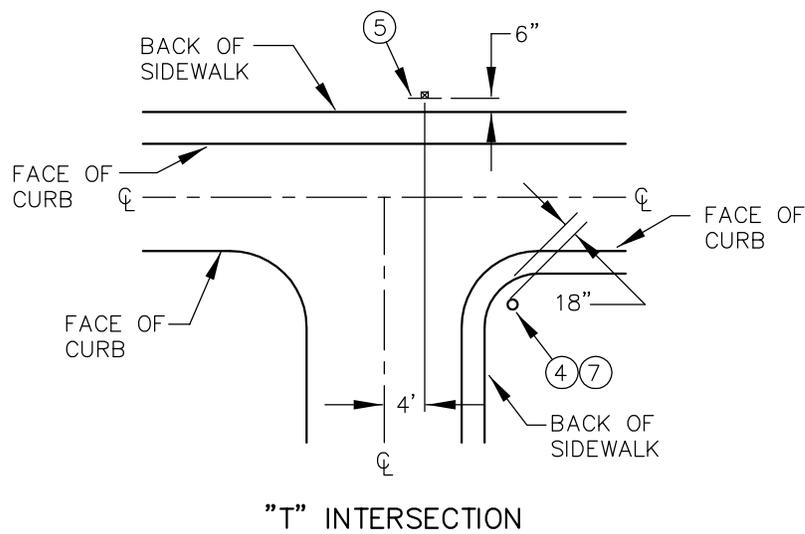
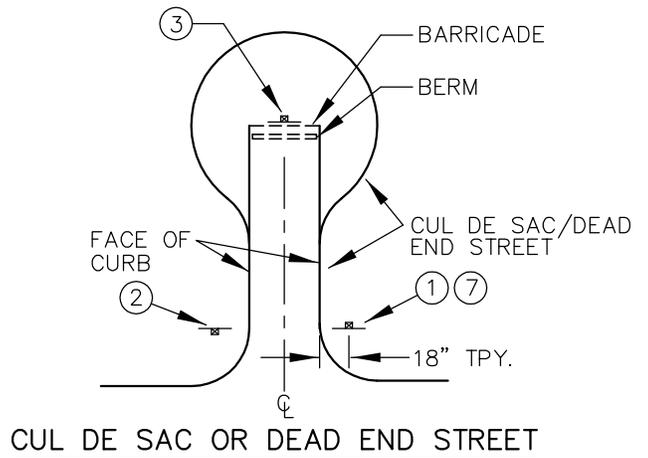
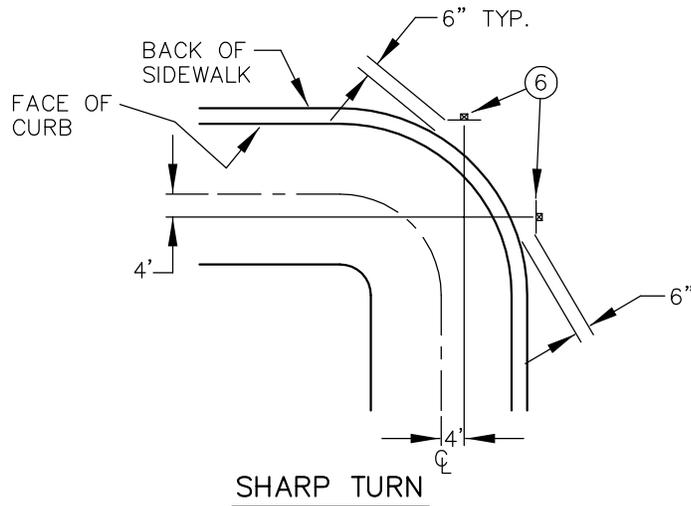
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-05

SCALE:
NONE

DATE:
09/13/11



DETAIL NOTES:

- ① W 53 NOT A THROUGH STREET SIGN. LOCATE AT END OF CURB RETURN.
- ② R1 STOP SIGN AS REQUIRED. R1 STOP SIGN IS TO BE ALIGNED WITH THE LIMIT LINE OR THE NEAR CROSS-WALK SEE DRAWING No.3-29.
- ③ W31 END SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN ON DEAD END STREET ONLY.
- ④ STREET NAME SIGNS WHEN COMBINED WITH R1 STOP SIGN, USE STOP SIGN LOCATION, OTHERWISE USE FAR RIGHT SIDE OF MAJOR STREET. TWO (2) SIGNS REQUIRED FOR 4 LEG INTERSECTION OF "MAJOR STREET".
- ⑤ W56 DOUBLE ARROW SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN. PLACE SIGN POST 6" FROM BACK OF SIDEWALK.
- ⑥ W57 DIRECTIONAL ARROW SIGN ATOP TYPE "N" MARKER REFLECTOR SIGN.
- ⑦ FOR SIDEWALKS GREATER THAN FOUR FEET (4') WIDE, THE CENTERLINE OF THE POST FOR TRAFFIC SIGNS SHALL BE EIGHTEEN INCHES (18") FROM THE FACE OF CURB. WHERE THE SIDEWALK WIDTH IS FOUR FEET OR LESS, TRAFFIC SIGNS SHALL BE INSTALLED AT THE BACK OF SIDEWALK, SEE SECTION 3.3.38.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TRAFFIC SIGN LOCATION**

APPROVED BY:

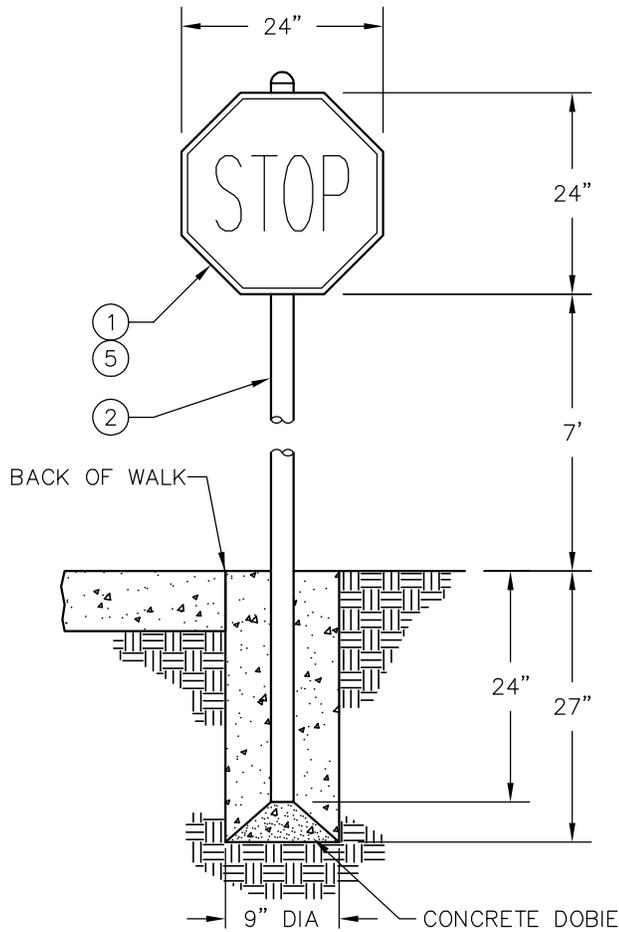
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-06

SCALE:
NONE

DATE:
09/13/11



**STOP SIGNS AND ALL
OTHER TRAFFIC SIGNS**

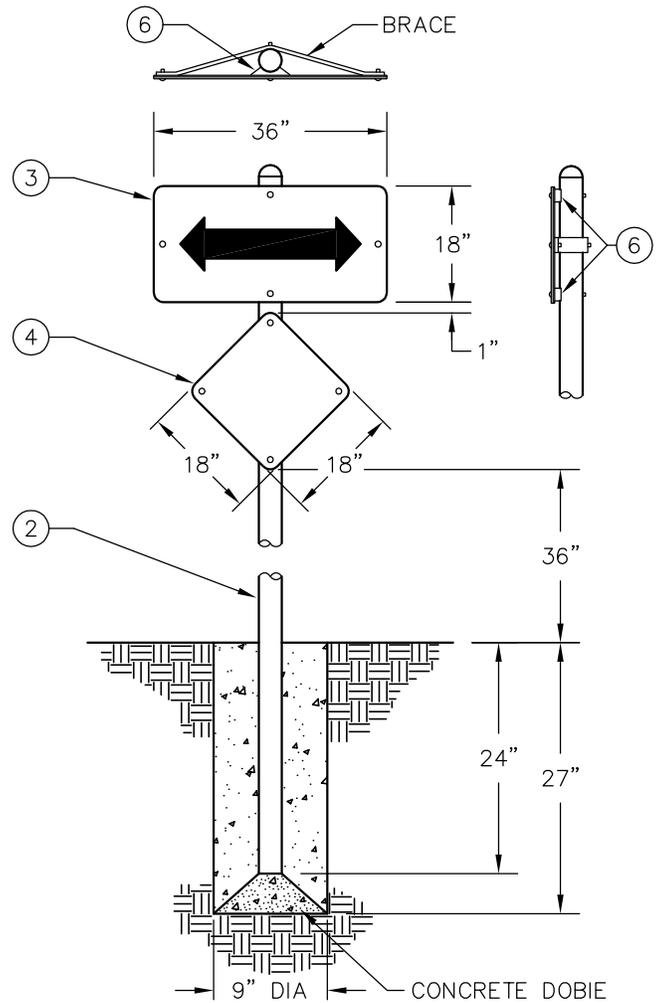
SPECIFIC NOTES

1. R1 STOP SIGN/ALL OTHER TRAFFIC SIGNS.
2. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
3. W56 OR W57 DIRECTION SIGNS.
4. SOLID YELLOW REFLECTOR FACE TYPE "H". SIGNS ARE TO BE MADE FROM 0.080 GAGE ALUMINUM SHEETED WITH A REFLECTOR FACE ACCORDING TO THE STATE OF CALIFORNIA DIVISION OF HIGHWAY SPECIFICATIONS.
5. ALL SIGNS REQUIRE 2 GALVANIZED STEEL SIGN SADDLES 1-1/2" x 4".
6. SIGN SADDLES.

NOTES FOR C-7 SIGN (ADVANCED STREET NAME SIGN)

1. SIGN SIZE 18" x VARIES.
2. HEIGHT 5' TO THE BOTTOM OF SIGN
3. LOCATION - IN MEDIAN, IF MEDIAN IS 4' OR GREATER, OTHERWISE BEHIND SIDEWALK.
4. FOR POST AND OTHER DETAILS, SEE CALTRANS STANDARD SPECIFICATIONS.

FOR APPROVAL.



CHANGE OF DIRECTION - WARNING SIGN

GENERAL NOTES

- A. 1"x1"x1/8" BRACE REQUIRED FOR UNBALANCED SIGNS 30" AND GREATER IN WIDTH.
- B. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.
- C. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.
- D. USE SAME INSTALLATION DIMENSIONS FOR ALL TRAFFIC SIGNS AS USED IN THE STOP SIGN.

HARDWARE (TYPICAL)

- 2 - 5/16"x3-1/2" CARRIAGE BOLTS
- 2 - 5/16" #18 KEEP NUT
- 2 - SIGN SADDLES
- 1 - PIPE CAP
- 1 - BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TRAFFIC SIGNS INSTALLATION**

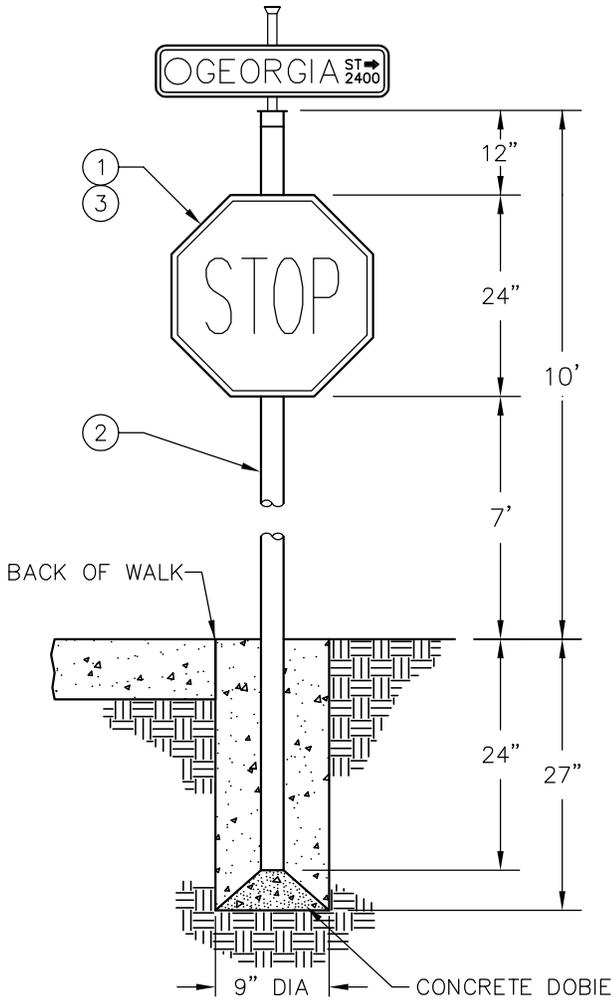
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

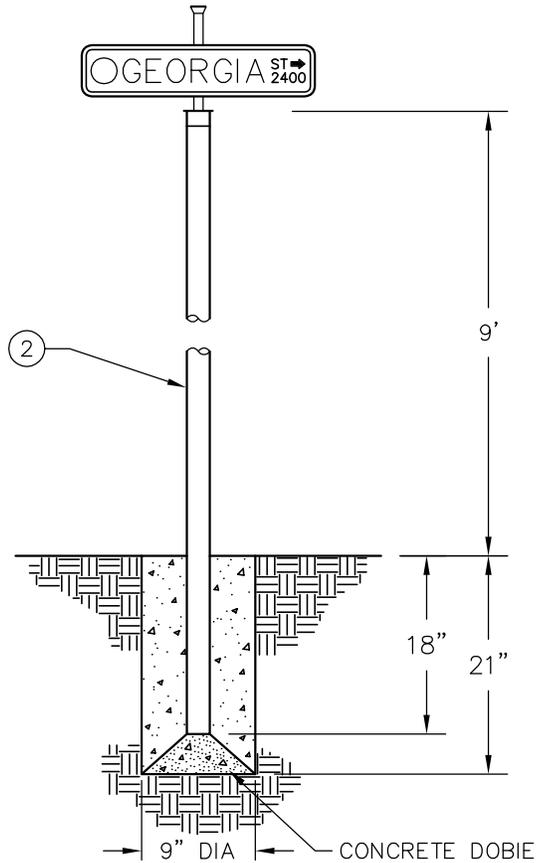
DRAWING NO:
7-07

SCALE:
NONE

DATE:
09/13/11



**COMBINED STREET NAME SIGN
AND STOP SIGN**



STREET NAME SIGN
(HARDWARE FOR STREET SIGNS
SEE SPECIFICATIONS)

SPECIFIC NOTES

1. R1 STOP SIGN.
2. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
3. ALL SIGNS REQUIRE 2 GALVANIZED STEEL SIGN SADDLES 1-1/2" x 4".

GENERAL NOTES

- A. 1"x1"x1/8" BRACE REQUIRED FOR UNBALANCED SIGNS 30" AND GREATER IN WIDTH.
- B. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.
- C. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.

HARDWARE (TYPICAL)

- 2 - 5/16"x3-1/2" CARRIAGE BOLTS
- 2 - 5/16" LOCKWASHERS
- 2 - 5/16" NUTS
- 2 - SIGN SADDLES
- 1 - PIPE CAP
- 1 - BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TRAFFIC SIGNS INSTALLATION**

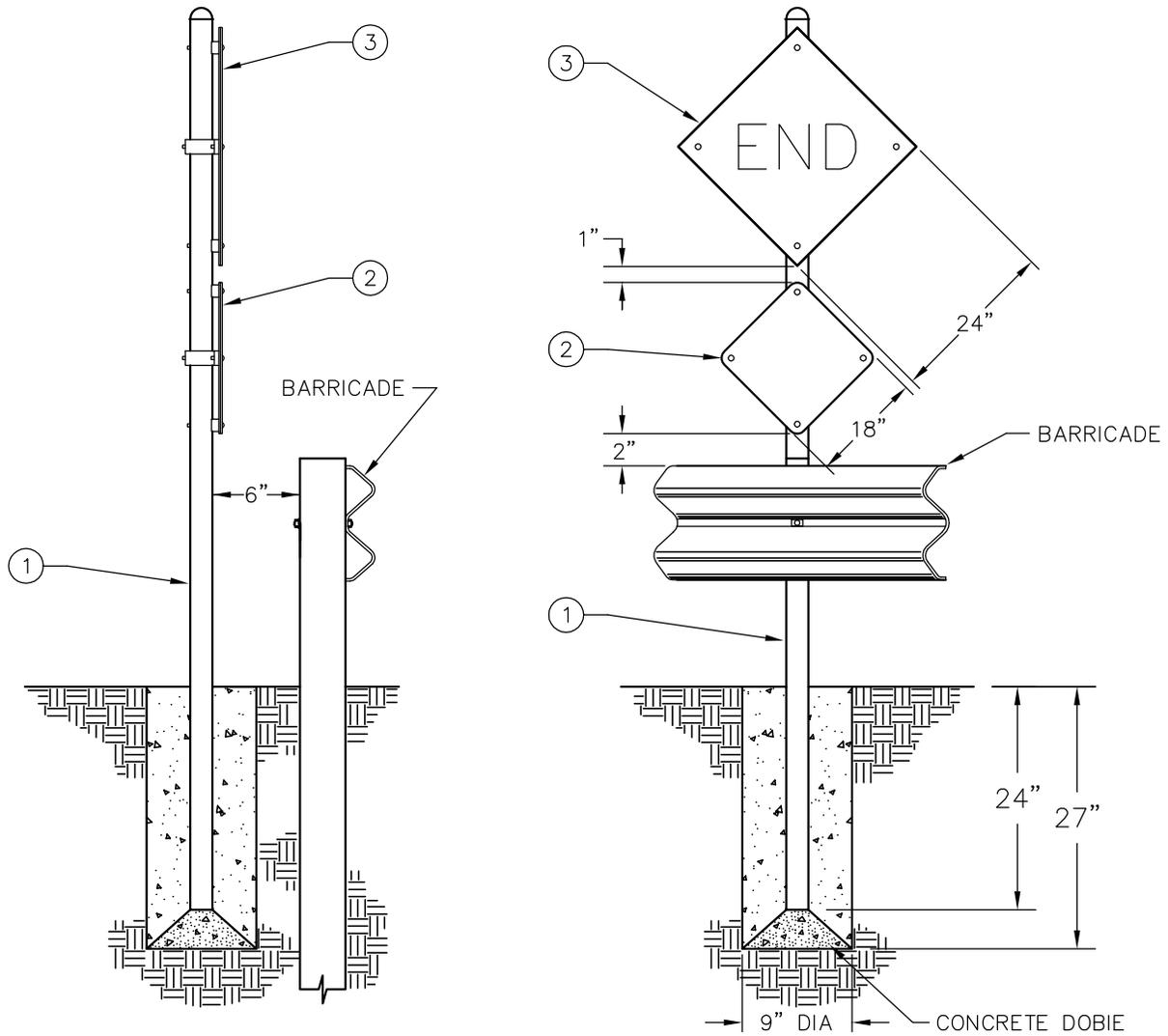
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-08

SCALE:
NONE

DATE:
09/13/11



DEAD END STREET BARRICADE WARNING SIGN

SPECIFIC NOTES

1. 2" DIA. GALVANIZED IRON PIPE (SCH 40).
2. SOLID YELLOW REFLECTOR FACE TYPE "H". SIGNS ARE TO BE MADE FROM 0.080 GAGE ALUMINUM SHEETED WITH A REFLECTOR FACE ACCORDING TO THE STATE OF CALIFORNIA DIVISION OF HIGHWAY SPECIFICATIONS.
3. W31 DEAD END SIGN.

GENERAL NOTES

- A. 30"x30" STOP SIGNS REQUIRED ON STREETS INTERSECTING STATE HIGHWAYS AND STREETS HAVING A WIDTH GREATER THAN 40'.
- B. FOR SIDEWALKS GREATER THAN 4' WIDE, THE CENTERLINE OF THE POST FOR STREET NAME AND STOP SIGNS SHALL BE 18" FROM FACE OF CURB.

HARDWARE (TYPICAL)

- 2 - 5/16" x 3-1/2" CARRIAGE BOLTS
- 2 - 5/16" #18 KEEP NUT
- 2 - SIGN SADDLES
- 1 - PIPE CAP
- 1 - BRACE, FOR SIGNS 30" OR GREATER, TO COVER FULL DIAMETER. (U-CLAMP TYPES OF HARDWARE ARE UNACCEPTABLE)



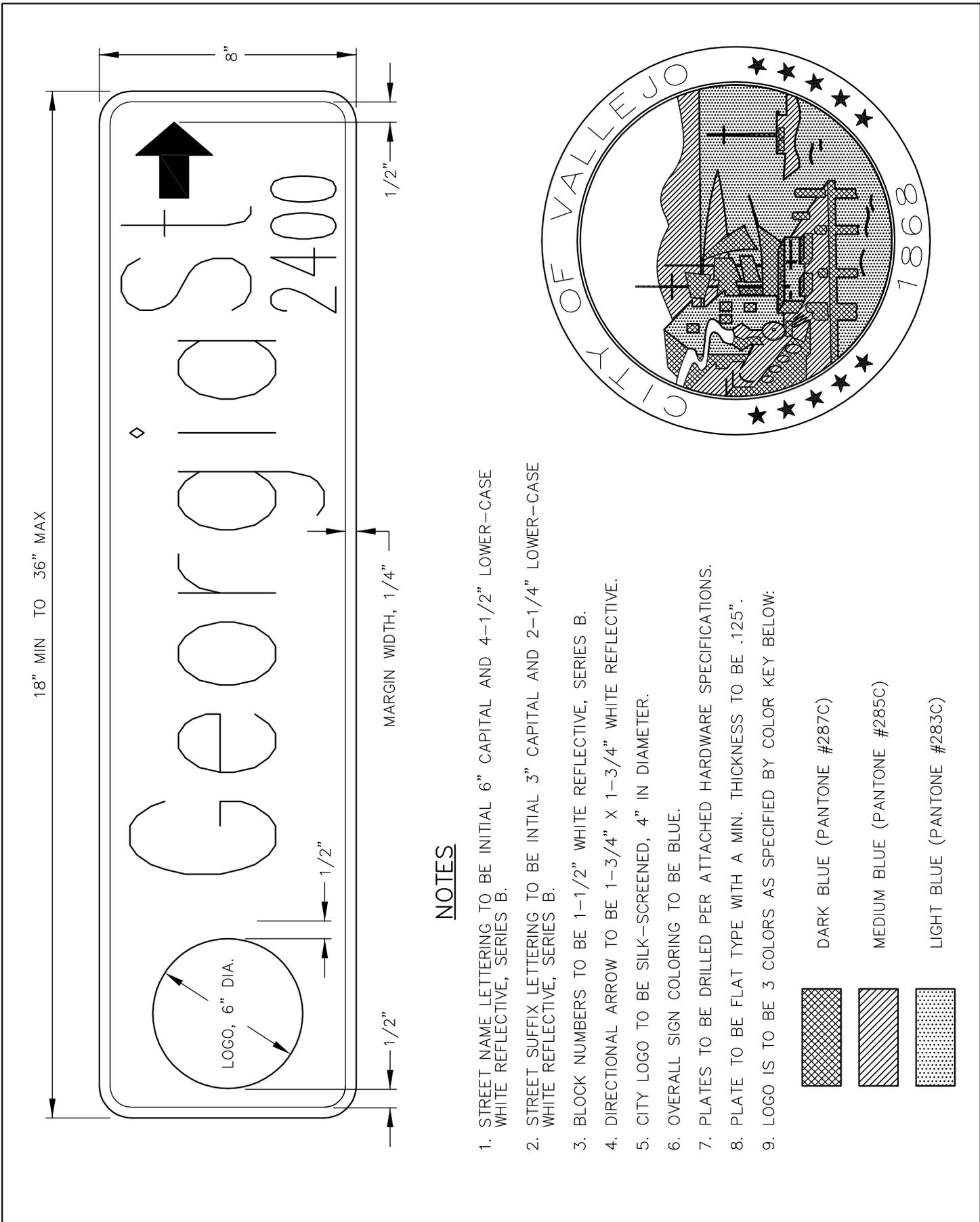
CITY OF VALLEJO STANDARD DETAIL

**STANDARD
TRAFFIC SIGN INSTALLATION**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO: 7-09
SCALE: NONE
DATE: 09/13/11



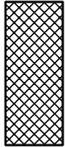
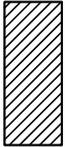
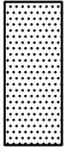
18" MIN TO 36" MAX

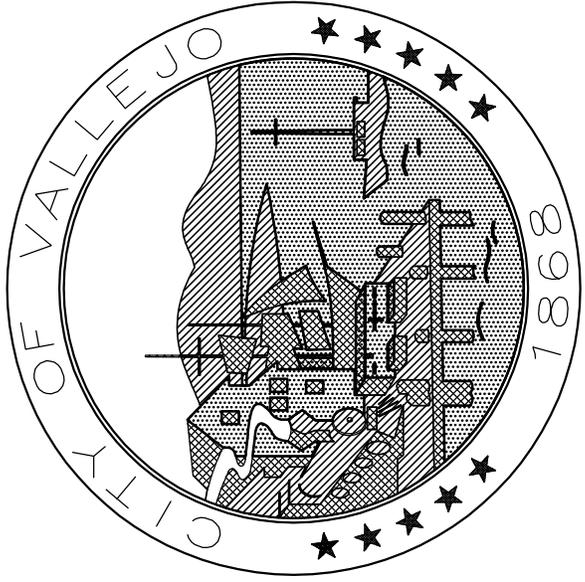
LOGO, 6" DIA.

MARGIN WIDTH, 1/4"

NOTES

1. STREET NAME LETTERING TO BE INITIAL 6" CAPITAL AND 4-1/2" LOWER-CASE WHITE REFLECTIVE, SERIES B.
2. STREET SUFFIX LETTERING TO BE INTIAL 3" CAPITAL AND 2-1/4" LOWER-CASE WHITE REFLECTIVE, SERIES B.
3. BLOCK NUMBERS TO BE 1-1/2" WHITE REFLECTIVE, SERIES B.
4. DIRECTIONAL ARROW TO BE 1-3/4" X 1-3/4" WHITE REFLECTIVE.
5. CITY LOGO TO BE SILK-SCREENED, 4" IN DIAMETER.
6. OVERALL SIGN COLORING TO BE BLUE.
7. PLATES TO BE DRILLED PER ATTACHED HARDWARE SPECIFICATIONS.
8. PLATE TO BE FLAT TYPE WITH A MIN. THICKNESS TO BE .125".
9. LOGO IS TO BE 3 COLORS AS SPECIFIED BY COLOR KEY BELOW:

	DARK BLUE (PANTONE #287C)
	MEDIUM BLUE (PANTONE #285C)
	LIGHT BLUE (PANTONE #283C)



CITY OF VALLEJO STANDARD DETAIL

STREET NAME SIGN SPECIFICATION

APPROVED BY:



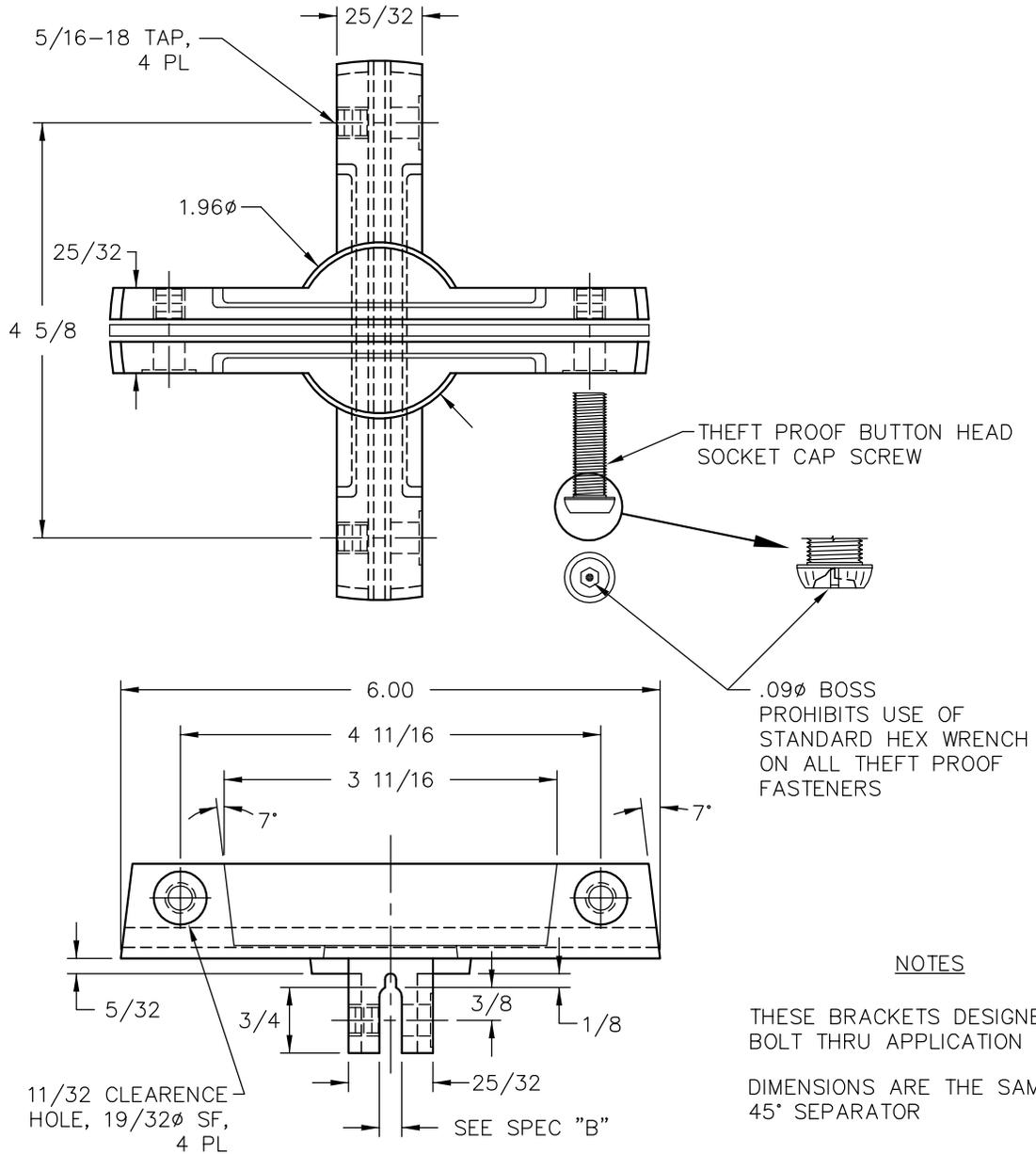
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-10

SCALE:
NONE

DATE:
09/13/11



SPECIFICATIONS

VANDAL-PROOF (BOLT-THRU) HARDWARE FOR STREET NAME SIGNS

- A.- ALL DIMENSIONS AND SPECIFICATIONS CONTAINED IN DRAWINGS.
- B.- MATERIAL, ALUMINUM HIGH STRENGTH ALLOY NO.380 OR 385 (A.S.T.M.B.-5 45T). HARDWARE SHALL BE SMOOTHLY FINISHED, PRECISION MACHINED TO FIT ALL STANDARD FLAT BLADE SECTIONS ALLOWING CLEARANCE FOR REFLECTIVE FACING ACCORDING TO REQUIREMENTS.
- C.- POST TO SIGN BRACKETS. THEY SHALL ATTACH FIRMLY ON STANDARD 2" PIPE BY MEANS OF THREE 5/16" THEFT-PROOF SET SCREWS, THRU A WALL SECTION HAVING .312 MINIMUM THICKNESS. BLADE SLOT SHALL BE 6" LONG, WITH SIGN BLADES SECURED IN PLACE BY 5/16" THEFT-PROOF TRUSS HEAD SCREW.
- D.- SIGN TO SIGN BRACKETS. SHALL BE 90 OR 45 DEGREE TYPE WITH MINIMUM REQUIRE AS THE POST TO SIGN BRACKET.
- E.- SAMPLE MUST BE SUBMITTED FOR BID ACCEPTANCE.



CITY OF VALLEJO STANDARD DETAIL

STANDARD
STREET SIGN BRACKET
90° SEPARATOR

APPROVED BY:

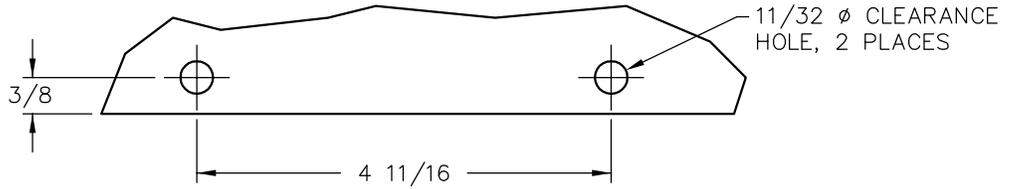
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

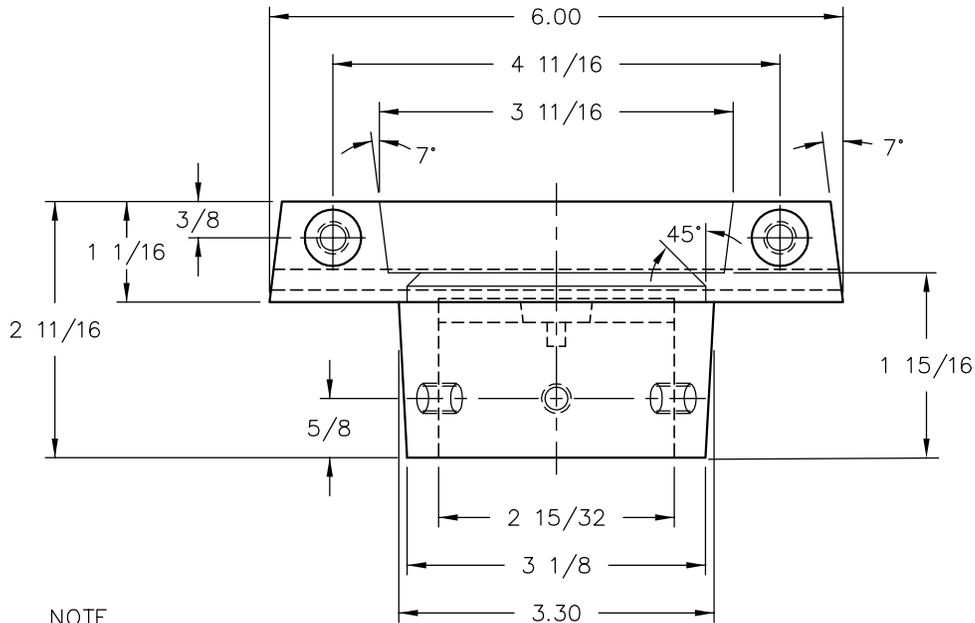
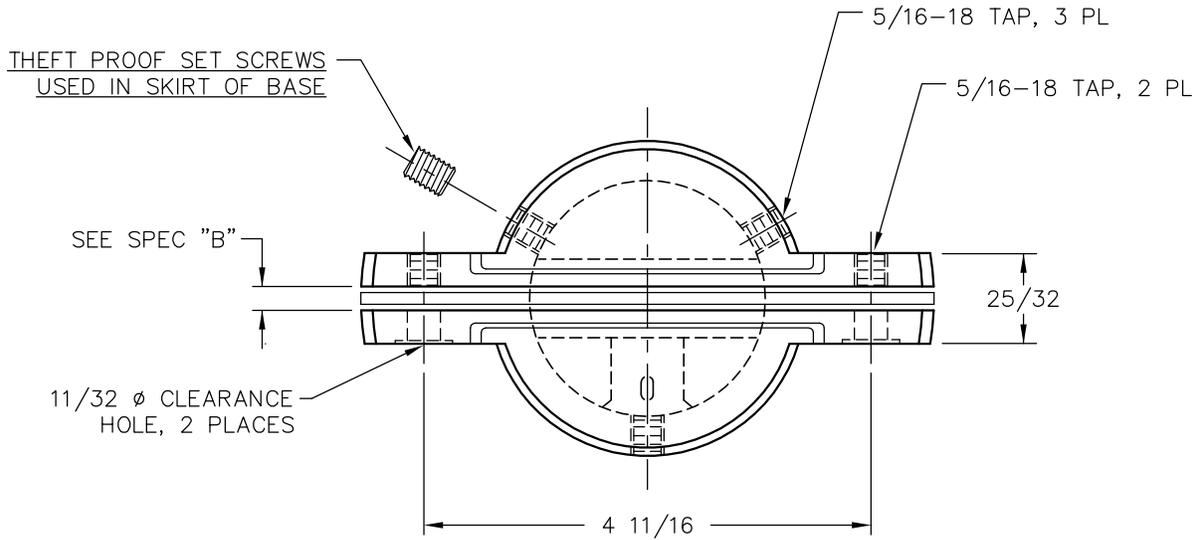
7-11

SCALE:
NONE

DATE:
09/13/11



SIGN BLADE MOUNTING HOLE PATTERN



NOTE
 THESE BRACKETS DESIGNED FOR
 BOLT THRU APPLICATION ONLY



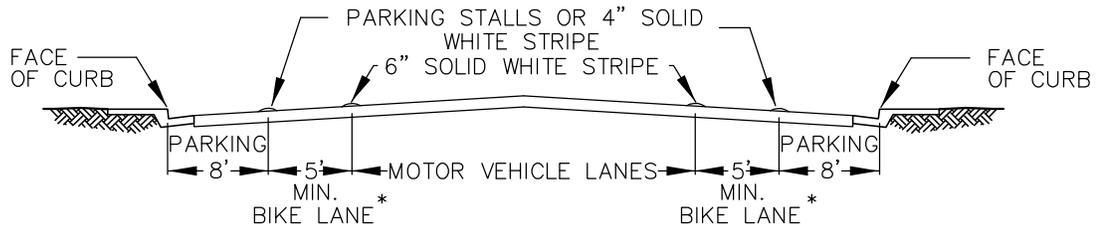
CITY OF VALLEJO STANDARD DETAIL

STANDARD
 STREET SIGN BRACKET
 POST CAP, SIGN HOLE DETAIL

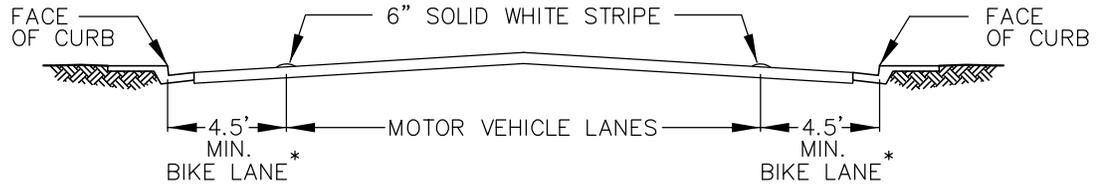
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

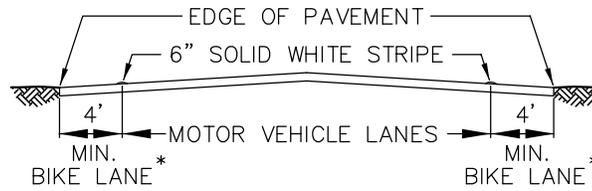
DRAWING NO:
7-12
 SCALE:
 NONE
 DATE:
 09/13/11



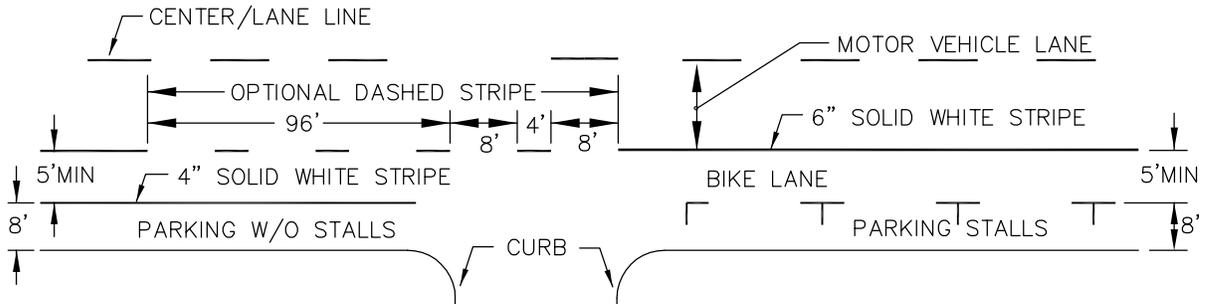
WHERE VEHICLE PARKING IS PERMITTED



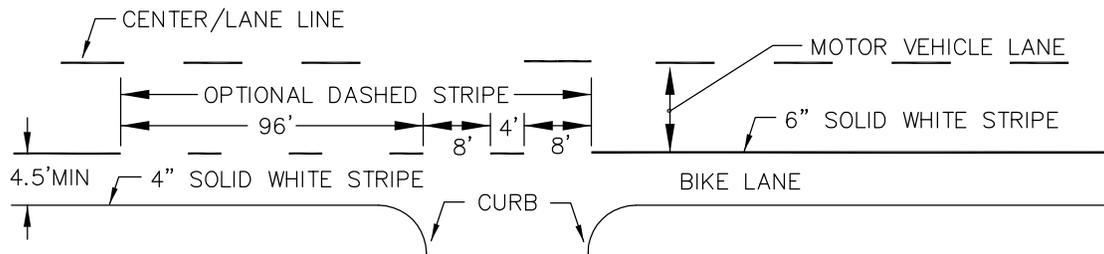
WHERE VEHICLE PARKING IS PROHIBITED



ROADWAY WITHOUT CURB



WHERE VEHICLE PARKING IS PERMITTED



WHERE VEHICLE PARKING IS PROHIBITED

NOTE:

* ALL BIKEWAY ROUTES SHALL BE POSTED WITH STATE REGULATORY AND GUIDE SIGNS AS DIRECTED.



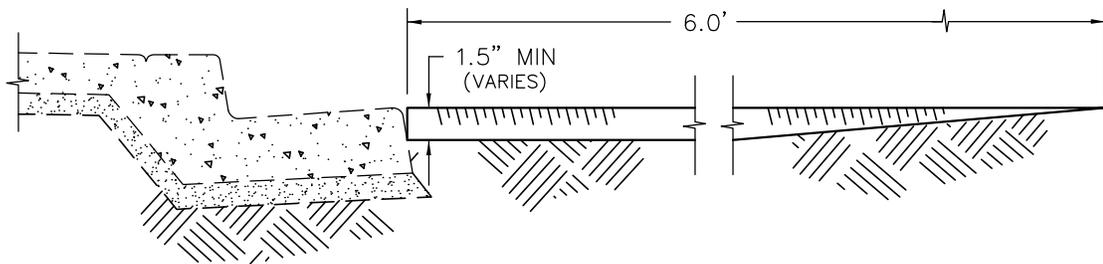
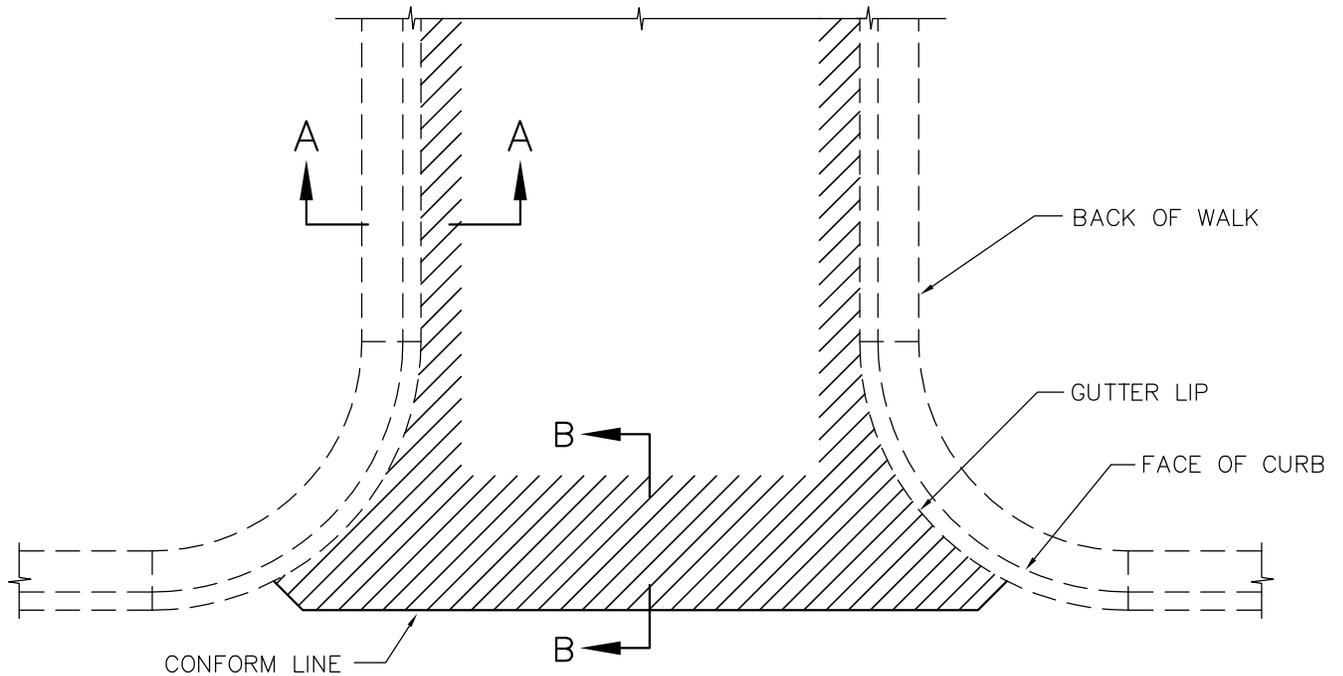
CITY OF VALLEJO STANDARD DETAIL

**TYPICAL BIKE LANE
CROSS-SECTION
AND LANDE MARKINGS**

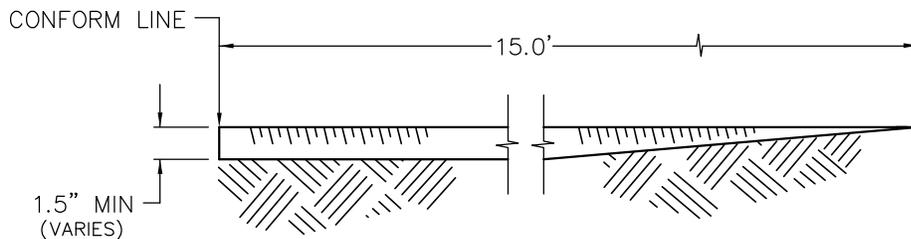
APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-13
SCALE:
NONE
DATE:
09/13/11



SECTION A-A



SECTION B-B

GENERAL NOTES:

1. IMMEDIATELY FOLLOWING GRINDING, THE GROUND AREAS SHALL BE SWEEPED CLEAN, FREE OF LOOSE MATERIAL AND DUST PARTICLES.
2. THE GROUND SURFACE SHALL BE NEAT WITH ALL SHATTERED, BROKEN OR LOOSE MATERIAL REMOVED AND DISPOSED PROPERLY.
3. TEMPORARY ASPHALTIC CUTBACK SHALL BE PLACED IMMEDIATELY FOLLOWING GRINDING AT INTERSECTION CROSSINGS, AND SHALL BE MAINTAINED TO PROVIDE A SMOOTH TRANSITION FOR TRAFFIC UNTIL PERMANENT PAVING IS PLACED.



CITY OF VALLEJO STANDARD DETAIL

**STANDARD
AC PAVEMENT
KEY CUTTING DETAIL**

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

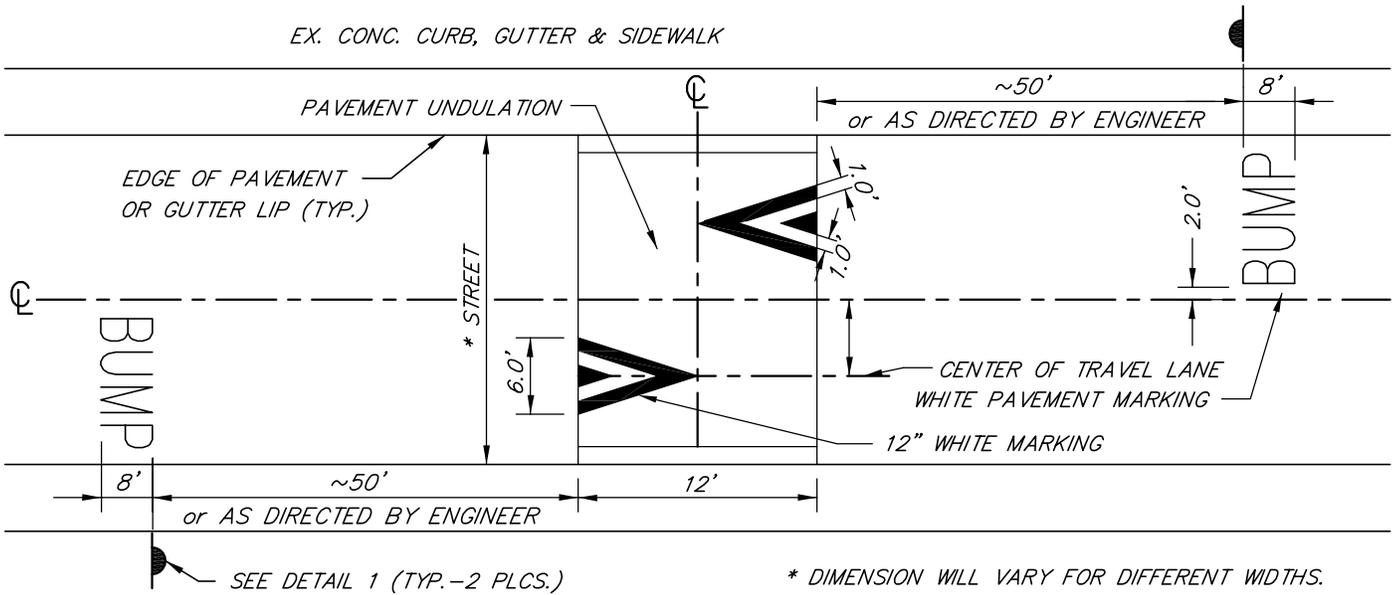
DRAWING NO:

7-14

SCALE:
NONE

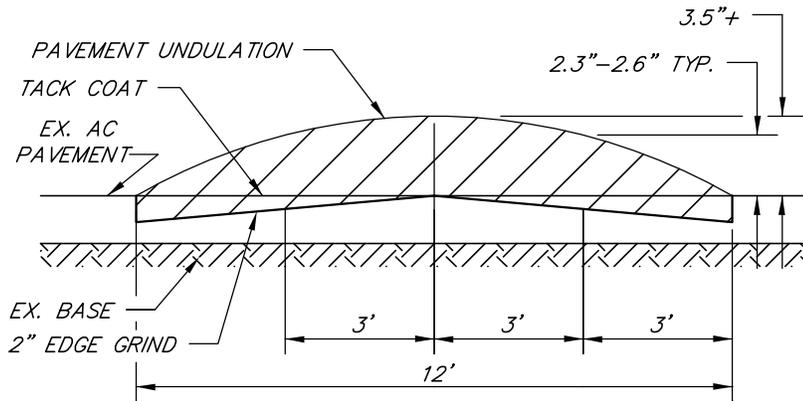
DATE:
09/13/11

EX. CONC. CURB, GUTTER & SIDEWALK

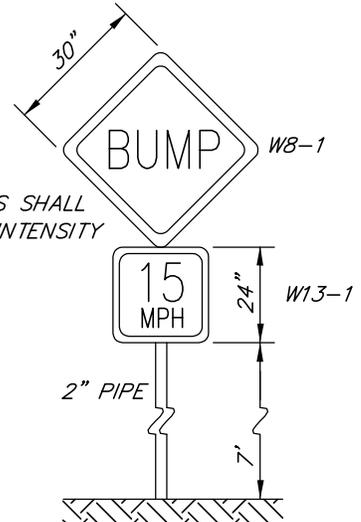


* DIMENSION WILL VARY FOR DIFFERENT WIDTHS.

PAVEMENT UNDULATION DETAIL

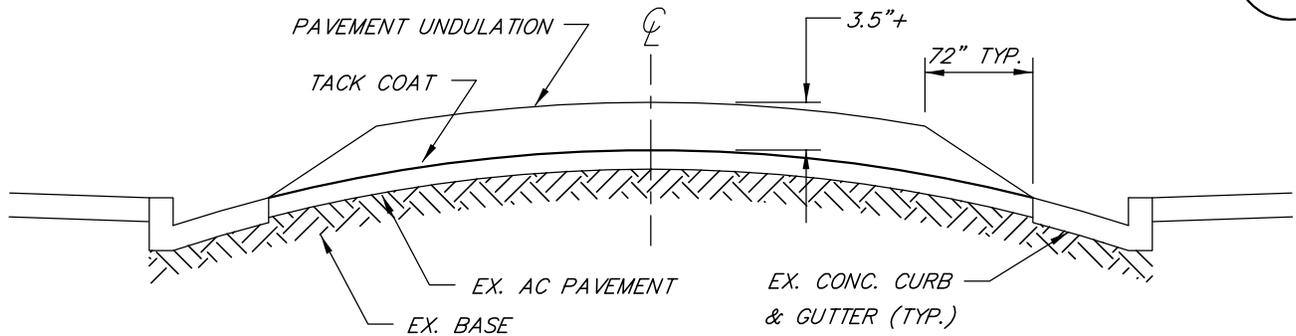
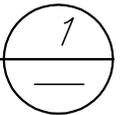


PROFILE



ALL SIGNS SHALL BE HIGH INTENSITY SHEETING

WARNING SIGN DETAIL



CROSS-SECTION



CITY OF VALLEJO STANDARD DETAIL

STANDARD
SPEED HUMP &
PAVEMENT UNDULATIONS

APPROVED BY:

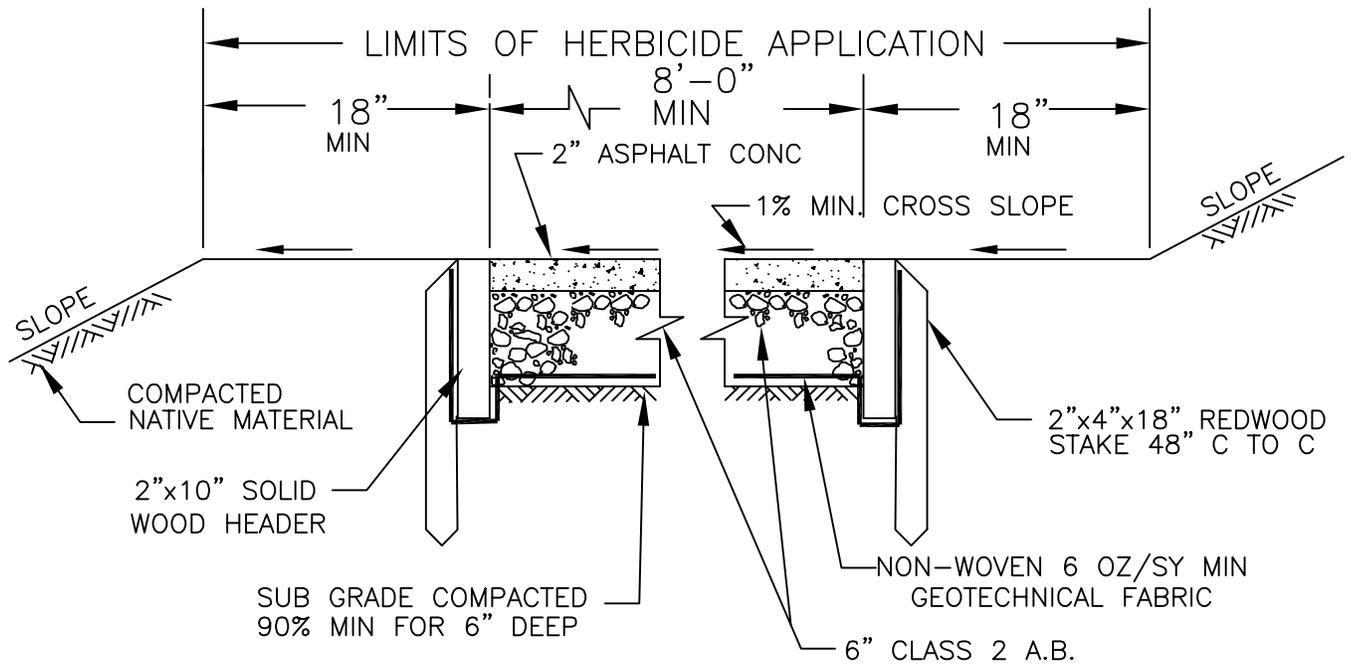
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-15

SCALE:
NONE

DATE:
09/13/11



SECTION VIEW

NOTES:

1. PRIOR TO THE INSTALLTION OF THE HEADER AND FILTER FABRIC, A HERBICIDE SHALL BE APPLIED TO THE SUBGRADE AND SIDES. A LICENSED PESTICIDE APPLICATOR UNDER THE DIRECTION OF A LICENSED PEST CONTROL ADVISOR WILL PROVIDE A RATE OF APPLICATION WHICH WILL FORM A PERMANENT BARRIER TO ROOT GROWTH.
2. HEADER MATERIAL SHALL BE REDWOOD CONSTRUCTION HEART OR PRESSURE TREATED DOUGLAS FIR. WHERE BENDS ARE REQUIRED WITH A RADIUS OF 20 FEET OR LESS BENDER BOARDS CAN BE USED. THE TOTAL THICKNESS SHALL BE EQUAL OR GREATER THAN THE THICKNESS OF THE SOLID WOOD HEADER.
3. THE WOOD HEADER SHALL BE INSTALLED PRIOR TO THE PLACEMENT OF THE CLASS 2 A.B. AND A.C.
4. NAIL STAKE TO HEADER WITH TWO 16d GALV. HOT DIP NAILS.
5. A PRIME COAT SHALL BE APPLIED TO ALL UNTREATED AGGREGATE BASE TWENTY FOUR(24) HOURS PRIOR TO PLACING ASPHALT. GRADE MC-250 SHALL BE APPLIED AT A RATE OF APPROXIMATELY 0.25 GALLON PER SQUARE YARD.
6. ASPHALTIC CONCRETE SHALL BE TYPE B WITH 1/2 INCH MAXIMUM AGGREGATE PER CALTRANS SECTION 39.
7. A TYPE II SLURRY SEAL PER CALTRANS SECTION 37-2 SHALL BE APPLIED TO THE BIKE PATH ONE (1) YEAR AFTER ALL THE ASPHALT CONCRETE HAS BEEN PLACED.



CITY OF VALLEJO STANDARD DETAIL

CITY STANDARD BIKE PATH

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-16

SCALE:
NONE

DATE:
09/13/11

DEFINITIONS

- A. FOOTCANDLE (FC)** - A UNIT OF MEASURE OF ILLUMINANCE. A UNIT OF ILLUMINANCE ON A SURFACE THAT IS ONE FOOT FROM A UNIFORM POINT SOURCE OF LIGHT EQUAL TO ONE LUMEN PER SQUARE FOOT. FOOTCANDLE VALUES CAN BE MEASURED DIRECTLY WITH HANDHELD INCIDENT LIGHT METER. ONE FOOTCANDLE IS EQUAL TO 1 LUMEN CAST PER SQUARE FOOT OF SURFACE. A TYPICAL SUNNY DAY CAN MEASURE BETWEEN 5,000 FC AND 10,000 FC. AN AVERAGE LIVING ROOM MEASURES 30 FC. A FULL MOON CAN PROVIDE 0.2 FC OF ILLUMINATION.
- B. ILLUMINANCE.** - THE TOTAL AMOUNT OF VISIBLE LIGHT ILLUMINATING A POINT ON A SURFACE FROM ALL DIRECTIONS ABOVE THE SURFACE. THIS SURFACE CAN BE A PHYSICAL SURFACE OR AN IMAGINARY PLANE. THEREFORE, ILLUMINANCE. IS EQUIVALENT TO IRRADIANCE WEIGHTED WITH THE RESPONSE CURVE OF THE HUMAN EYE. STANDARD UNIT FOR ILLUMINANCE. IS LUX (LX), WHICH IS LUMENS PER SQUARE METER (LM/M²).
- C. HORIZONTAL ILLUMINANCE** - IS THE MEASURE OF BRIGHTNESS FROM A LIGHT SOURCE USUALLY MEASURED IN FOOTCANDLES OR LUMENS, WHICH IS TAKEN THROUGH A LIGHT SENSOR AT A HORIZONTAL SURFACE.
- D. VERTICAL ILLUMINANCE** - IS THE MEASURE OF BRIGHTNESS FROM A LIGHT SOURCE, USUALLY MEASURED IN FOOTCANDLES OR LUMENS, WHICH IS TAKEN THROUGH A LIGHT SENSOR AT A VERTICAL POSITION OR VERTICAL SURFACE.
- E. UNIFORMITY RATIO** - DESCRIBES THE UNIFORMITY OF LIGHT LEVELS ACROSS AN AREA. THIS MAY BE EXPRESSED AS A RATIO OF AVERAGE TO MINIMUM OR IT MAY BE EXPRESSED AS A RATIO OF MAXIMUM TO MINIMUM LEVEL OF ILLUMINATION FOR A GIVEN AREA.
- F. IESNA (IES)** - ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA. THE SOCIETY HAS INFORMED AND EDUCATED MEMBERS, THE LIGHTING COMMUNITY AND CONSUMERS ON THE ASPECTS OF GOOD LIGHTING PRACTICE FOR OVER NINETY YEARS. THE MEMBERS OF IESNA INCLUDE ARCHITECTS, ENGINEERS, DESIGNERS, EDUCATORS, STUDENTS, CONTRACTORS, MANUFACTURERS, AND SCIENTISTS. IESNA PROVIDES THE TECHNICAL GUIDELINES AND STANDARDS, PROFESSIONAL JOURNALS AND EDUCATIONAL.
- G. ICA** - THE INTERNATIONAL CPTED ASSOCIATION. ICA IS COMMITTED TO CREATING SAFER AND IMPROVED ENVIRONMENT THROUGH THE APPLICATION OF CPTED PRINCIPLES AND STRATEGIES.
- H. CPTED** - CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN. CPTED ADVOCATES THAT ADEQUATE DESIGN AND PROPER USE OF THE ENVIRONMENT CAN REDUCE CRIME AND FEAR OF CRIME, THEREBY IMPROVING THE QUALITY OF LIFE. CPTED STRIVES TO CREATE SAFER ENVIRONMENTS THROUGH SENSITIVE DESIGN. THE CONCEPT OF ATTRACTIVE NUISANCE IS PART OF THE CPTED. THE CONCEPT REFLECTS THE IDEA THAT A POTENTIALLY HARMFUL OBJECT CAN DRAW THE ATTENTION OF A CHILD AND RAISE A DESIRE TO INVESTIGATE OR PLAY. EXAMPLES INCLUDE CONSTRUCTION SITES, PONDS AND FOUNTAINS, TUNNELS, WELLS AND OTHERS. CPTED ESTABLISHES LIGHTING GUIDELINES BASED ON THE RISK ACTIVITY OF THE AREA.
- I. GENERAL PARKING AND PEDESTRIAN AREA** - PEDESTRIANS CONFLICT WITH VEHICLES ARE LIKELY TO OCCUR.
- J. VEHICULAR USE AREA** - CONFLICTS WITH PEDESTRIANS ARE NOT LIKELY TO OCCUR.

ROADWAY ILLUMINATION

- A. COMMERCIAL AREA** - DENSELY DEVELOPED BUSINESS AREA OUTSIDE, AS WELL AS WITHIN, THE CENTRAL PART OF MUNICIPALITY. NIGHTTIME VEHICULAR AND/OR PEDESTRIAN TRAFFIC WITHIN SUCH AREAS WOULD BE CHARACTERIZED AS RELATIVELY HEAVY.
- B. INTERMEDIATE AREA** - DEVELOPED AREA OUTSIDE, AS WELL AS WITHIN, THE CENTRAL PART OF THE MUNICIPALITY COMPRISED OF LIBRARIES, COMMUNITY RECREATION CENTERS, LARGE APARTMENT COMPLEXES, INDUSTRIAL BUILDINGS, OR NEIGHBORHOOD, RETAIL, ETC. NIGHTTIME VEHICULAR AND/OR PEDESTRIAN TRAFFIC WITHIN SUCH AREAS WOULD BE CHARACTERIZED AS MODERATE TO MODERATELY HEAVY.
- C. RESIDENTIAL AREA** - DEVELOPED AREA COMPRISED OF RESIDENTIAL DEVELOPMENTS, OR A MIXTURE OF RESIDENTIAL AND SMALL COMMERCIAL DEVELOPMENTS. THIS DEFINITION INCLUDES AREAS OF SINGLE FAMILY HOMES, TOWN HOUSES, SMALL APARTMENT BUILDINGS, AND CONSERVATION AREAS. NIGHTTIME VEHICULAR AND/OR PEDESTRIAN TRAFFIC WITHIN SUCH AREAS WOULD BE CHARACTERIZED AS LIGHT.

ROADWAY CLASS	SUB CLASS WIDTH	AVE FC	UNIFORMITY RATIO EAVG/EMIN RATIO
MAJOR	COMMERCIAL	1.7	3:1
	INTERMEDIATE	1.3	3:1
	RESIDENTIAL	0.9	3:1
COLLECTOR	COMMERCIAL	1.2	4:1
	INTERMEDIATE	0.9	4:1
	RESIDENTIAL	0.6	6:1
LOCAL	COMMERCIAL	0.9	6:1
	INTERMEDIATE	0.7	6:1
	RESIDENTIAL	0.4	6:1



CITY OF VALLEJO STANDARD DETAIL

ILLUMINATION #1

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-17

SCALE:
NONE

DATE:
09/13/11

DEVELOPMENT ILLUMINATION

CPTED (CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN)

UNIFORMITY RATIO (MAX TO MIN) MAY RANGE UP TO 6:1.
THE LIGHTING LEVELS SPECIFIED ARE THE MINIMUM AVERAGE LEVELS ACCEPTABLE.

HIGH USE ACTIVITY (4-5 fc):

ATM, CLUSTER MAIL BOXES, PAY PHONES, GATED COMMUNITY ENTRIES, PEDESTRIAN TUNNELS AND COVERED PEDESTRIAN WALKWAYS (BREEZEWAYS), BUS/TRANSIT SHELTERS, ALL EXTERIOR ENTRANCES

MEDIUM HIGH USE ACTIVITY (3-4 fc):

CONVENIENCE STORES, COVERED PARKING (CARPORTS), FAST FOOD, PHARMACIES, POOL HALLS, LOADING DOCKS/AREAS, GROCERY STORES (24 HOUR, IMMEDIATE PARKING AREA), ESTABLISHMENTS LICENSE FOR THE SALE OF LIQUOR, PARKING STRUCTURES (10 FC DAYTIME)

MEDIUM USE ACTIVITY (2-3 fc):

GAS STATIONS, ENTERTAINMENT/AMUSEMENT, VIDEO STORES, LAUNDRIES, BANKS, RESTAURANTS (NO LIQUOR, HOTEL/MOTELS, VIDEO HALLS, CARD/TELEMARKETING, MALLS

MEDIUM LOW USE ACTIVITY (1-2 fc):

MULTI-HOUSING, HEALTH CARE, INDUSTRIAL (NIGHT USE), PRESCHOOLS, WORSHIP, HOSPITAL, GENERAL RETAIL, DENTAL, WAREHOUSE (NIGHT USE), EDUCATIONAL, STORAGE GENERAL OFFICE (NIGHT USE), GROCERY STORES (NON-24 HOURS)

LOW USE ACTIVITY (0.5-1 fc):

WAREHOUSE (DAY USE), OFFICE (DAY USE ONLY), GREENBELT, CAR DEALERS (AFTER HOURS), PARKS, INDUSTRIAL (DAY USE, MINI-STORAGE, RETENTION AREAS, WALKWAYS IN APARTMENT COMPLEXES

COMMERCIAL OPEN PARKING AREAS:

LEVELS REFLECT BOTH TRAFFIC AND PEDESTRIAN ACTIVITY, WHICH ARE SHOWN BY THE FOLLOWING, BUT NOT LIMITED TO:

HIGH - MAJOR LEAGUE ATHLETIC EVENTS, MAJOR CULTURAL OR CIVIC EVENTS, REGIONAL SHOPPING CENTERS, AND FAST FOOD FACILITIES.

MEDIUM - COMMUNITY SHOPPING CENTERS, CULTURAL, CIVIC OR RECREATIONAL EVENTS, OFFICE PARKS, HOSPITAL PARKING AREAS, TRANSPORTATION PARKING (AIRPORTS, COMMUTER, ETC.), RESIDENTIAL COMPLEX PARKING

LOW - NEIGHBORHOOD SHOPPING, INDUSTRIAL EMPLOYEE PARKING, EDUCATIONAL FACILITY PARKING, CHURCH PARKING

OPEN PARKING AREAS	LEVEL OF ACTIVITY	GENERAL PARKING AND PEDESTRIAN AREA			VEHICLE USE AREA (ONLY)		
		LUX (MINIMUM ON PAVEMENT)	FOOTCANDLES (MINIMUM ON PAVEMENT)	UNIFORMITY RATIO	LUX (MINIMUM ON PAVEMENT)	FOOTCANDLES (MINIMUM ON PAVEMENT)	UNIFORMITY RATIO
	HIGH	10	0.9	4:1	22	2	3:1
	MEDIUM	6	0.6	4:1	11	1	3:1
	LOW	2	0.2	4:1	5	0.5	4:1

COVERED PARKING AREAS	AREAS	Day		Night		UNIFORMITY RATIO
		LUX AVG ON PAVEMENT)	FOOTCANDLES (AVG. ON PAVEMENT)	LUX AVG ON PAVEMENT)	FOOTCANDLES (AVG. ON PAVEMENT)	
	GENERAL PARKING & PEDESTRIAN AREAS	54	5	54	5	4:1
	RAMPS AND CORNERS	110	10	54	5	4:1
	ENTRANCE AREAS	540	50	54	5	4:1

OTHER REQUIREMENTS

IN ALL PEDESTRIAN AND INDOOR PARKING AREAS, THE VERTICAL LUX (FOOTCANDLE) IS REQUIRED EQUIVALENT TO THE HORIZONTAL VALUES AT 6' ABOVE THE PAVEMENT.



CITY OF VALLEJO STANDARD DETAIL

ILLUMINATION #2

APPROVED BY:

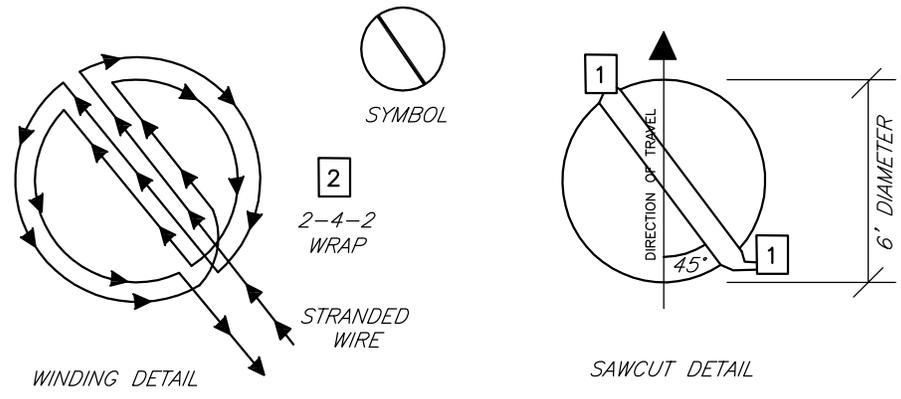
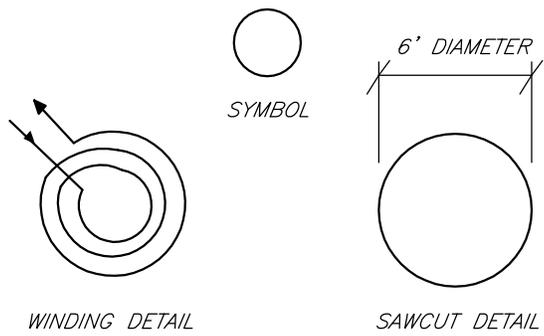
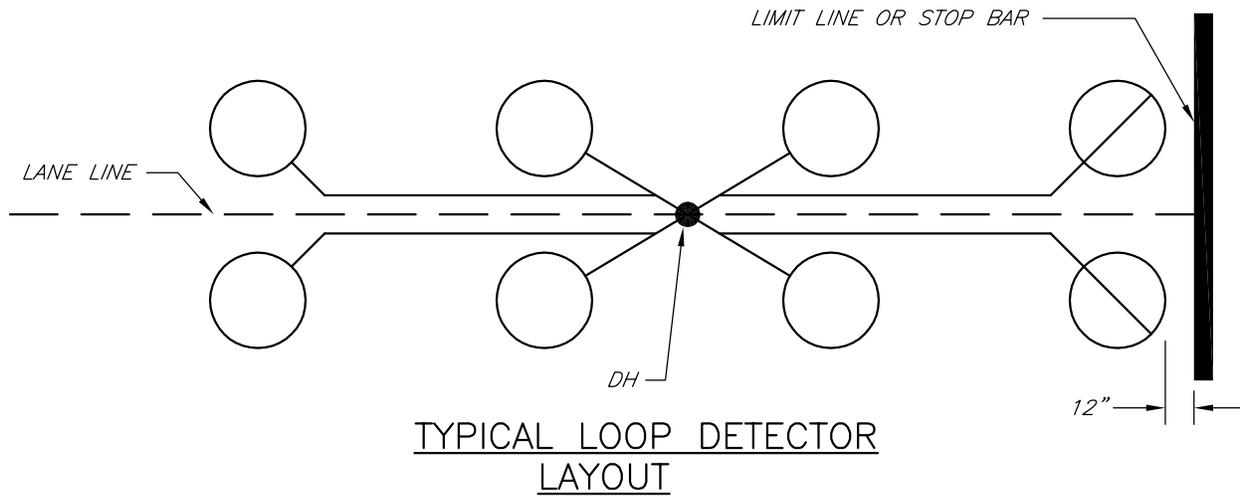
DIRECTOR OF PUBLIC WORKS

DRAWING NO:

7-18

SCALE:
NONE

DATE:
09/13/11



- 1** ROUND CORNERS OF ACUTE ANGLES TO PREVENT DAMAGE TO CONDUCTORS
- 2** INSTALL 2-4-2 TURNS WHEN ONE TYPE PHASE LOOP IS IN SERIES WITH AN ADDITIONAL CIRCULAR LOOP ON A SENSOR UNIT CHANNEL. FOR SLOT DETAIL SEE LOOP INSTALLATION PROCEDURE, STANDARD PLAN ES-5A.



CITY OF VALLEJO STANDARD DETAIL

CIRCULAR LOOP INSTALLATION

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

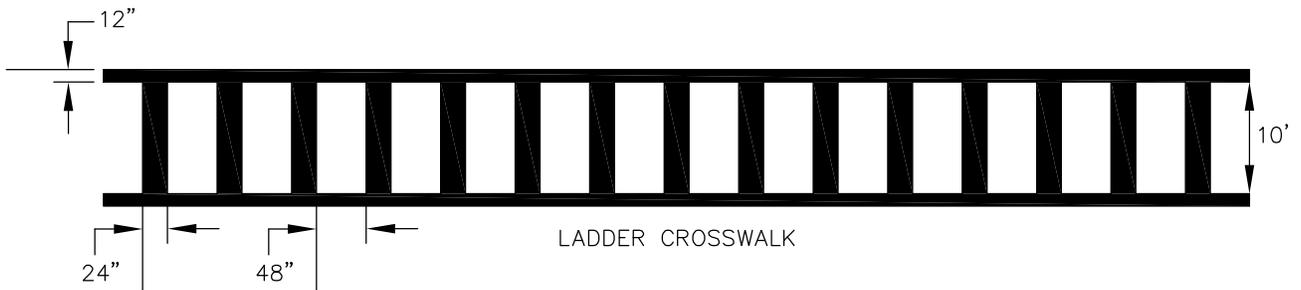
DRAWING NO:
7-19

SCALE:
NONE

DATE:
09/13/11



STANDARD CROSSWALK



LADDER CROSSWALK

NOTES

- ① CROSSWALKS SHALL BE THERMOPLASTIC.
- ② CROSSWALKS SHALL BE YELLOW WITHIN 2,800 FEET OF SCHOOL GROUNDS..
- ③ CROSSWALKS SHALL BE ALIGNED WITH CURB RAMP LANDING.
- ④ CROSSWALK WIDTH MAY BE GREATER THAN 10 FEET AT THE DISCRETION OF THE TRAFFIC ENGINEER.



CITY OF VALLEJO STANDARD DETAIL

CROSSWALK STANDARDS

APPROVED BY:

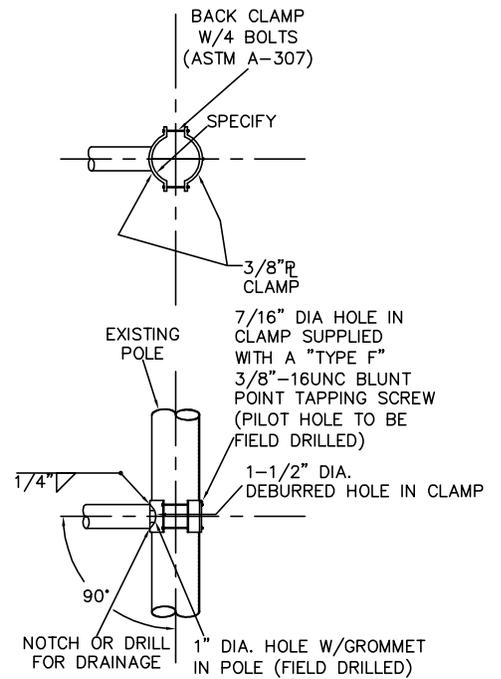
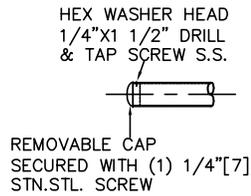
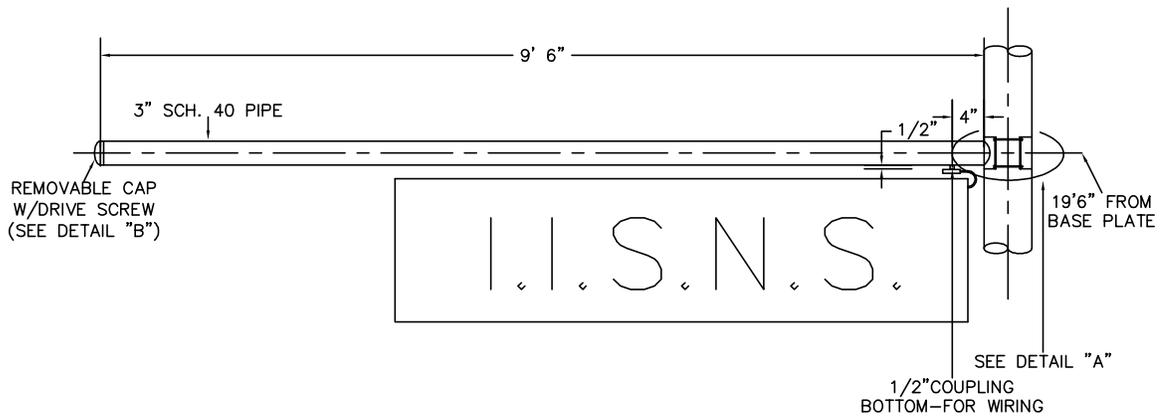
A handwritten signature in black ink, likely belonging to the Director of Public Works.

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-20

SCALE:
NONE

DATE:
09/13/11



CITY OF VALLEJO STANDARD DETAIL

I.I.S.N.S. STANDARD

APPROVED BY:

DIRECTOR OF PUBLIC WORKS

DRAWING NO:
7-21

SCALE:
NONE

DATE:
09/13/11