File No. 16.01.266
June 9, 2020

ADDENDUM NO. 1
Construction Management, Inspection, and Testing Services for the
Southern Heights Boulevard Bridge Replacement Project
Federal Project No. BRLO 5043 (038)
City Project No. 11282

THE CHANGES IN THIS ADDENDUM SHALL BE INCLUDED IN THE RFQ AND THIS ADDENDUM SHALL BE PART OF THE RFQ DOCUMENTS. ALL CONDITIONS NOT AFFECTED BY THIS ADDENDUM SHALL REMAIN UNCHANGED.

This addendum is issued to reflect changes, clarifications, additions, and respond to questions associated with the Request for Qualifications (RFQ) dated June 4, 2020:

Question 1
What is the engineer's estimate and is it available? Who is the design firm?

Response: The engineer's estimate is $3.05M, a copy of which is attached. The design firm is Mark Thomas and Company.

Question 2
Does the Consultant team need to provide biological services or is this item contractor-supplied?

Response: Biological services are only necessary if tree removal occurs during the nesting season. Per the specifications, the biologist would be Contractor-supplied.

Question 3
Does the Consultant team need to provide SWPPP quality assurance inspection?

Response: Per Caltrans Standard Specifications, the Contractor's Water Pollution Control Manager is responsible for SWPPP inspection.

Question 4
Are the project specifications available for review?

Response: The technical specifications are attached to this addendum.

By: Hunter Young

Hunter Young
Assistant Public Works Director/City Engineer

MARK THOMAS

City of San Rafael
Southern Heights Boulevard Bridge Replacement
Final Engineer's Estimate

6/9/2020

									FEDERAL PARTICIPATION		NON-FEDERAL (LOCAL)	
Item No.	**Spec Section**	**Item Code**	**Item Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Total Amount**		**Federal Eligibility Ratio**	**Total Amount**	**Non-Federal Eligibility Ratio**	**Total Amount**
			ROADWAY ITEMS									
1	18-2	999990	MOBILIZATION (10%)	LS	1	$ 300,000.00	$ 300,000.00		100%	$ 300,000.00	0%	$ -
2	18-2	130100	CONSTRUCTION SITE MANAGEMENT	LS	1	$ 40,000.00	$ 40,000.00		100%	$ 40,000.00	0%	$ -
3	18-2	130300	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	1	$ 30,000.00	$ 30,000.00		100%	$ 30,000.00	0%	$ -
4	18-2	130200	WATER POLLUTION CONTROL PROGRAM	LS	1	$ 40,000.00	$ 40,000.00		100%	$ 40,000.00	0%	$ -
5	18-2	130680	TEMPORARY FENCE (TYPE ESA)	LF	760	$ 10.00	$ 7,600.00		100%	$ 7,600.00	0%	$ -
6	18-2	490554	TEMPORARY SITE ACCESS IMPROVEMENTS	LS	1	$ 100,000.00	$ 100,000.00		100%	$ 100,000.00	0%	$ -
7	18-3	120100	SIGNS AND TRAFFIC CONTROL	LS	1	$ 50,000.00	$ 50,000.00		100%	$ 50,000.00	0%	$ -
8	18-5	170103 A	CLEARING AND GRUBBING AND REMOVALS	LS	1	$ 75,000.00	$ 75,000.00		100%	$ 75,000.00	0%	$ -
9	18-5.08	190101	ROADWAY EXCAVATION	CY	80	$ 250.00	$ 20,000.00		100%	$ 20,000.00	0%	$ -
10	18-5	170103 B	REMOVE TREE & STUMP 24" TO 60"	EA	9	$ 20,000.00	$ 180,000.00		100%	$ 180,000.00	0%	$ -
11	18-5.05	782110	RESET MAILBOX	EA	2	$ 300.00	$ 600.00		100%	$ 600.00	0%	$ -
12	18-6.01	198010	IMPORTED BORROW	CY	70	$ 160.00	$ 11,200.00		100%	$ 11,200.00	0%	$ -
13		202027 A	INSTALL MMWD WATERLINE	LS	1	$ 60,000.00	$ 60,000.00		0%	$ -	100%	$ 60,000.00
14	18-7	398200 A	COLD PLANE ASPHALT CONCRETE PAVEMENT (0.2' DEPTH)	SY	80	$ 80.00	$ 6,400.00		100%	$ 6,400.00	0%	$ -
15	18-8	260203	CLASS 2 AGGREGATE BASE	CY	40	$ 200.00	$ 8,000.00		100%	$ 8,000.00	0%	$ -
16	18-9	390132 A	HOT MIX ASPHALT (TYPE A)	TON	70	$ 300.00	$ 21,000.00		100%	$ 21,000.00	0%	$ -
17	18-9	394077	PLACE HOT MIX ASPHALT DIKE (TYPE F)	LF	140	$ 40.00	$ 5,600.00		100%	$ 5,600.00	0%	$ -
18	18-10	510501	MINOR CONCRETE (PATHWAY, IRRIGATION TANK PAD & CURB)	LS	1	$ 7,000.00	$ 7,000.00		100%	$ 7,000.00	0%	$ -
19	18-11	510094 B	DRAINAGE INLET AND TURNING STRUCTURE	EA	3	$ 6,000.00	$ 18,000.00		100%	$ 18,000.00	0%	$ -
20	18-11	641101	12" STORM DRAIN PIPE (TYPE S HDPE)	LF	220	$ 225.00	$ 49,500.00		100%	$ 49,500.00	0%	$ -
21	18-12	839218 A	STEEL BACKED TIMBER BARRIER	LF	175	$ 140.00	$ 24,500.00		100%	$ 24,500.00	0%	$ -
22	18-12	839218 B	STEEL BACKED TIMBER BARRIER (MOD STEEL POST) (APPROACH SLAB)	LF	60	$ 200.00	$ 12,000.00		100%	$ 12,000.00	0%	$ -
23	18-12	839218 C	STEEL BACKED TIMBER BARRIER (MOD STEEL POST SLEEVE)	EA	1	$ 2,000.00	$ 2,000.00		100%	$ 2,000.00	0%	$ -
24	18-13	820250	REMOVE ROADSIDE SIGN - ONE POST	EA	5	$ 200.00	$ 1,000.00		100%	$ 1,000.00	0%	$ -
25	18-13	820840	ROADSIDE SIGN - ONE POST (METAL POST)	EA	4	$ 750.00	$ 3,000.00		100%	$ 3,000.00	0%	$ -
26	18-13	820840 A	ROADSIDE SIGN - ONE POST (MOD TIMBER BARRIER ATTACHED)	EA	2	$ 2,000.00	$ 4,000.00		100%	$ 4,000.00	0%	$ -
27	18-13	820134	OBJECT MARKER (TYPE P)	EA	4	$ 250.00	$ 1,000.00		100%	$ 1,000.00	0%	$ -
28	18-14	840506	TRAFFIC STRIPES AND PAVEMENT MARKINGS	LS	1	$ 5,000.00	$ 5,000.00		100%	$ 5,000.00	0%	$ -
					SUBTOTAL - ROADWAY ITEMS		**$ 1,082,400.00**			**$ 1,022,400.00**		**$ 60,000.00**
			STRUCTURAL ITEMS (RETAINING WALL)									
29		192049	STRUCTURE EXCAVATION (SOLDIER PILE WALL)	CY	10	$ 300.00	$ 3,000.00		100%	$ 3,000.00	0%	$ -
30		193029	STRUCTURE BACKFILL (SOLDIER PILE WALL)	CY	7	$ 400.00	$ 2,800.00		100%	$ 2,800.00	0%	$ -
31		193116	CONCRETE BACKFILL (SOLDIER PILE WALL)	CY	5	$ 500.00	$ 2,500.00		100%	$ 2,500.00	0%	$ -
32		193119	LEAN CONCRETE BACKFILL	CY	3	$ 1,000.00	$ 3,000.00		100%	$ 3,000.00	0%	$ -
33		490310 A	STEEL SOLDIER PILE (HP 10 X 57)	LF	82	$ 250.00	$ 20,500.00		100%	$ 20,500.00	0%	$ -
34		490400	24" DRILLED HOLE	LF	66	$ 200.00	$ 13,200.00		100%	$ 13,200.00	0%	$ -
35		510080	STRUCTURAL CONCRETE, APPROACH SLAB	CY	33	$ 2,500.00	$ 82,500.00		100%	$ 82,500.00	0%	$ -
36		520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	700	$ 2.00	$ 1,400.00		100%	$ 1,400.00	0%	$ -
37		530200	STRUCTURAL SHOTCRETE	CY	5	$ 3,000.00	$ 15,000.00		100%	$ 15,000.00	0%	$ -
38		575004	TIMBER LAGGING	MFBM	1.40	$ 10,000.00	$ 14,000.00		100%	$ 14,000.00	0%	$ -
39		590120	CLEAN AND PAINT STEEL SOLDIER PILING	LS	1	$ 30,000.00	$ 30,000.00		100%	$ 30,000.00	0%	$ -
					SUBTOTAL - WALL ITEMS		**$ 187,900.00**			**$ 187,900.00**		**$ -**
			STRUCTURAL ITEMS (BRIDGE)									
40		192003	STRUCTURE EXCAVATION (BRIDGE)	CY	146	$ 300.00	$ 43,800.00		100%	$ 43,800.00	0%	$ -
41		193003	STRUCTURE BACKFILL (BRIDGE)	CY	21	$ 400.00	$ 8,400.00		100%	$ 8,400.00	0%	$ -
42		19XXXX	CELLULAR CONCRETE LIGHTWEIGHT EMBANKMENT MATERIAL	CY	152	$ 250.00	$ 38,000.00		100%	$ 38,000.00	0%	$ -
43		490603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	122	$ 400.00	$ 48,800.00		100%	$ 48,800.00	0%	$ -
44		490605	36" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	92	$ 600.00	$ 55,200.00		100%	$ 55,200.00	0%	$ -
45		510053	STRUCTURAL CONCRETE, BRIDGE	CY	87	$ 2,500.00	$ 217,500.00		100%	$ 217,500.00	0%	$ -
46		510054	STRUCTURAL CONCRETE, BRIDGE (POLYMER FIBER)	CY	115	$ 2,500.00	$ 287,500.00		100%	$ 287,500.00	0%	$ -
47		510080	STRUCTURAL CONCRETE, APPROACH SLAB	CY	19	$ 2,500.00	$ 47,500.00		100%	$ 47,500.00	0%	$ -
48		511111	DRILL AND BOND DOWEL (CHEMICAL ADHESIVE)	LF	50	$ 150.00	$ 7,500.00		100%	$ 7,500.00	0%	$ -
49		520102	BAR REINFORCING STEEL (BRIDGE)	LB	54500	$ 2.00	$ 109,000.00		100%	$ 109,000.00	0%	$ -
50		570120 A	TIMBER DECK (PEDESTRIAN ACCESS)	LS	1	$ 40,000.00	$ 40,000.00		100%	$ 40,000.00	0%	$ -
51		600097	BRIDGE REMOVAL	LS	1	$ 100,000.00	$ 100,000.00		100%	$ 100,000.00	0%	$ -
52		750501	MISCELLANEOUS METAL (BRIDGE)	LB	1050	$ 35.00	$ 36,750.00		0%	$ -	100%	$ 36,750.00
53		839700 A	CALIFORNIA ST-70SM SIDE MOUNTED BRIDGE RAIL	LF	275	$ 700.00	$ 192,500.00		100%	$ 192,500.00	0%	$ -
					SUBTOTAL - BRIDGE ITEMS		**$ 1,232,450.00**			**$ 1,195,700.00**		**$ 36,750.00**
			LANDSCAPE ITEMS									
54	18-22	208271	IRRIGATION SYSTEM	LS	1	$ 15,000.00	$ 15,000.00		100%	$ 15,000.00	0%	$ -
55	18-22	204030 A	SLOPE RESTORATION AND TREE PLAN	LS	1	$ 75,000.00	$ 75,000.00		100%	$ 75,000.00	0%	$ -
56	18-22	475010	GRAVITY BLOCK RETAINING WALL	SF	100	$ 70.00	$ 7,000.00		100%	$ 7,000.00	0%	$ -
57	18-22	803100	RECONSTRUCT FENCE	LF	25	$ 300.00	$ 7,500.00		100%	$ 7,500.00	0%	$ -
58	18-23	870200	BRIDGE LIGHTING SYTEM	LS	1	$ 100,000.00	$ 100,000.00		100%	$ 100,000.00	0%	$ -
						SUBTOTAL - LANDSCAPE ITEMS	**$ 204,500.00**			**$ 204,500.00**		**$ -**
						SUBTOTAL CONTRACT ITEMS	$ 2,707,250.00			$ 2,610,500.00		$ 96,750.00
						CONTINGENCY - CONTRACT ITEMS (10%)	$ 270,725.00			$ 261,050.00		$ 9,675.00
						TOTAL OPINION OF PROBABLE SUPPLEMENTAL COSTS (SEE BELOW)	$ 77,000.00			$ -		$ 77,000.00
						TOTAL OPINION OF PROBABLE CONSTRUCTION COSTS	**$ 3,054,975**			**$ 2,871,550**		**$ 106,425**

SUPPLEMENTAL WORK

Item No.	**Item Code**	**Item Code**	**Item Description**	**Unit**		**Unit Price**	**Total Amount**					
59	18-9	390132	HOT MIX ASPHALT (TYPE A) (MEYER RD)	TON	100	$ 400.00	$ 40,000.00		0%	$ -	100%	$ 40,000.00
60	18-7	398200	COLD PLANE ASPHALT CONCRETE PAVEMENT (0.20' MAX) (MEYER RD)	SY	750	$ 40.00	$ 30,000.00		0%	$ -	100%	$ 30,000.00
							SUBTOTAL - SUPPLEMENTAL WORK	**$**	**70,000.00**	**$ -**		**$ 70,000.00**
							SUPP CONTINGENCY - CONTRACT ITEMS (10%)	**$**	**7,000.00**	**$ -**		**$ 7,000.00**
							TOTAL OPINION OF PROBABLE SUPPLEMENTAL COSTS	**$**	**77,000.00**	**$ -**		**$ 77,000.00**

CITY OF SAN RAFAEL
SOUTHERN HEIGHTS BRIDGE REPLACEMENT

TECHNICAL SPECIFICATIONS

6/1/2020

Julie Passalacqua, PE — Date
Registered Civil Engineer No. 68407
Exp. 09/30/2021

6/1/2020

Daniel Blomquist, PE — Date
Registered Civil Engineer No. 65875
Exp. 12/31/2021

6/1/2020

Christine Anderson, LA — Date
Registered Landscape Architect No. 3377
Exp. 02/28/2021

6/1/2020

Kin Chan, PE — Date
Registered Civil Engineer No. 55391
Exp. 12/31/2020

TABLE OF CONTENTS

18-1 GENERAL

All construction shall be in accordance with the 2018 Caltrans (State) Standard Plans and Specifications, Revised Caltrans Standard Plans, and the July 2018 Marin County Uniform Construction Standards, and the City of San Rafael codes and ordinances.

The City makes the following supplemental project information available:

Supplemental Project Information

Means	Description
Included in the *Information Handout*	Final Foundation Report dated May 29, 2018
Available as specified in the *Standard Specifications*	Bridge as-built drawings
Included with the project plans	Log of test borings

Hours of work shall be between 7:00 A.M. to 5:00 P.M on weekdays, or as directed by the Engineer and these Technical Specifications. The Contractor shall not perform any work, including warming up and servicing equipment, receiving deliveries, and other related work prior to 7:00 A.M. Work on weekends may be approved by the Engineer at no additional cost to the contract. For the purposes of counting Working Days, the City and Contractor will use the Caltrans 5-day Construction Workday Calendar for the current calendar year. No lane closures will be allowed beyond the limits of work on Southern Heights Boulevard, except for resurfacing on Meyer Road, unless written approval is provided in advance from the Engineer.

18-1.01 ORDER OF WORK

Order of work shall conform to these Technical Specifications.

- The first order of work shall be to prepare and submit a work plan, progress schedule for all items of work and traffic and pedestrian control plans in a form provided by or acceptable to the Engineer. The work plan and schedule shall be updated weekly to reflect all items of work performed at the site and shall clearly indicate the proposed completion date. **No work may begin under contract until the Progress Schedule and Traffic Control Plan have been approved by the Engineer.** Time required for review and approval of these items shall not constitute a basis for time extension.

- The second order of work shall be to prepare and submit a Water Pollution Control Plan prepared and signed by a qualified Stormwater Pollution Prevention Plan Developer (QSD) per Section 18-1.06 of these Technical Specifications.

- The third order of work shall be to coordinate with the various private utility companies for adjustment to grade of utility boxes/vault and lids as well as for permanent relocation of PG&E, AT&T and Comcast facilities upon completion of project construction.

- The contractor must notify the affected residents in writing two weeks and via telephone 72 hours prior to any work within or abutting residential properties. Reconstruction of existing residential driveways must be done with minimal impact to resident's access. **The contractor must provide walk-in access for residents at 116 and 122 Southern Heights Boulevard at all times.**

The property at 122 Southern Heights Boulevard must have a secure perimeter fence at all times except when contractor personnel require access to the property to construct the proposed improvements. During work that requires contractor to temporarily remove or open the fence or gate to the property, the

contractor must notify the affected residents two weeks prior to make provisions to secure the resident's dogs.

Contractor is to protect and maintain properties and facilities within the TCE during construction. Damages to the on-site improvements within the TCE, including drainage, landscape, irrigation, and driveways will be repaired or restored at Contractor's expense.

Following completion of the project, in areas where landscaping will not be provided, all fill slopes, areas of temporary impact, and/or otherwise disturbed areas shall be restored to preconstruction contours and revegetated with the native seed mix. Invasive exotic plants will be controlled to the maximum extent practicable. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in restoring the temporarily impacted areas, as specified in these Technical Specifications, and as directed by the Engineer, shall be considered as included in various items of work, and no additional compensation will be allowed therefor.

All earthmoving equipment to be used during project construction should be thoroughly cleaned before arriving on the project site to avoid spreading any nonnative invasive species. The Contractor shall clean any construction related debris, mud, rocks, etc. on the roadways leading to or around the construction site if such debris, mud, rocks, etc. is a result of construction related work. Should it be necessary, the Contractor shall retain the services of a street sweeping machine to perform said work at no additional costs to the City.

The above item(s) shall clearly disclose the Contractor's proposed procedures and methods of operation, including identifying any special equipment intended for use on the project and his method of handling traffic. It will be the responsibility of the Contractor to arrange for the towing and removal of any vehicles which have not been removed by the owner and which interfere with any operations.

18-1.02 OBSTRUCTIONS

Attention is directed to Section 5-1.36C, "Nonhighway Facilities," and Section 15, "Existing Facilities," of the State Standard Specifications and these Technical Specifications.

The Contractor's attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workmen and of the public.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least two working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Notification Center
Underground Service Alert - Northern California (USA)
1(800)227-2600

It is not the intent of the plans to show the exact location of existing or relocated utilities, and the Engineer assumes no responsibility therefore. Whenever any such utilities are indicated thereon, the Contractor shall be responsible for verifying their actual location and depth in the field.

If needed, the Contractor shall pothole all locations identified by USA prior to any digging to positively verify the location of all utilities. **All costs for potholing shall be considered as included in the contract prices for various items of work and no additional compensation will be allowed therefore. The Contractor shall provide the City with the results of potholing activity.**

The Contractor shall backfill and replace the street section in place following potholing activity in a manner acceptable to the City and the utility. The precise location of the potholing shall be marked in the field by the Engineer with the utility's concurrence.

It is the Contractor's responsibility to coordinate any potholing work with the necessary utilities.

The Contractor will not be entitled to damages or additional payment for delays, mobilization or demobilization caused by a utility conflict with any of the proposed improvements or the utility company's failure to appear on site at the designated date and time whether for potholing, relocating facilities, adjusting utility boxes/vaults to grade, or any other private utility work.

18-1.03 EXISTING HIGHWAY FACILITIES

The work performed in connection with various existing highway facilities shall conform to the provisions in Section 15, "Existing Facilities," of the State Standard Specifications and these Technical Specifications.

Except as otherwise provided for damaged materials in Section 15-1.03C, "Salvaging Facilities," of the State Standard Specifications, the materials to be salvaged shall remain the property of the City, and shall be cleaned, packaged, bundled, tagged, and hauled to the City storage, or as directed by the Engineer. A minimum of 48 hours prior to hauling salvaged material to the storage area. All salvaged material shall be hauled to the City Corporation Yard located at 111 Morphew Street by the Contractor unless another location is specified. Should the City determine not to accept salvaged material, the Contractor shall dispose of such at the Contractor's expense.

Unless otherwise specified, all materials as shown on the plans to be removed, or as field marked and as directed by the Engineer to be removed shall be disposed of outside the project limits. The contract work area shall be left with a neat and finished appearance. At the end of each work day the project site shall be swept clean or washed to the satisfaction of the Engineer at no additional cost to the City.

Do not store or permit debris to accumulate on site. If Contractor fails to remove excess debris promptly by the end of the work day, the City reserves right to cause same to be removed at Contractor's expense.

18-1.04 COOPERATION

Comply with Section 5-1.20, "Coordination with Other Entities," of the State Standard Specifications.

Staged construction activities will require the temporary closure of the driveway to 116 Southern Heights Boulevard and the pathway to 122 Southern Heights Boulevard. The contractor must notify residents in writing at least two (2) weeks and again at 72 hours prior to any planned closure of the driveway and pathway.

Contractor must notify adjacent property owners two (2) weeks prior to beginning construction activities which will impact property fences. No removal of property fencing will be allowed with contacting the property owner and resident unless approved by the Engineer.

The contractor is required to coordinate construction activities on, around, and that will impact access to the property at 116 Southern Heights Boulevard in the southeast quadrant of the project. The contractor must notify the property owner, in writing, two weeks prior to any work within the property or any work that will impact access to the existing driveway. Notification shall include a description of the work to be performed, a work plan, and a proposed duration of construction activities. Vehicle access to the property

shall be restored daily and unless approved in advance by the Engineer. **With the exception of during repaving the asphalt driveway, the Contractor shall provide a dedicated walking path for access to the property at all times. If the Contractor exceeds the allowable working days for the construction contract, additional liquidated damages in the amount of $400 per day will be assessed to the Contractor for each calendar day the property owner experiences access limited to only use of the dedicated walking path.**

The primary point of contact for coordination with the property owners shall be provided to the contractor at the pre-construction meeting.

18-1.05 COORDINATION WITH UTILITIES

The City previously initiated the process with the various utility agencies to relocate existing utilities. The existing water and gas pipelines mounted to the existing bridge have been deactivated, however, the Contractor shall confirm such information on site with utility representatives. The Contractor will now need to coordinate with PG&E, AT&T, and Comcast for the relocation of one wood utility pole and overhead wires if this work is not addressed before the City issues the Notice to Proceed with construction.

The Contractor shall coordinate with the utility agencies, as noted on the plans, to insure adjustment of existing facilities is addressed concurrently during construction by the utility agencies own forces such that utility covers are flush with the finish roadway elevations. Utility covers in roadway areas shall be adjusted to grade by utility agency forces prior to the City's Contractor placing new HMA pavement. The Contractor shall coordinate with private utility companies for adjustment and/or relocation of private facilities. The cost to perform this coordination is included in the various items of work involved and no separate payment will be made therefore.

PG&E has completed installation of a new gas line on Southern Heights Boulevard and abandoned the existing gas line mounted on the bridge. Removal and disposal of the existing gas line on the bridge is the responsibility of the City's Contractor. The price paid for removal of existing gas lines is included in the price paid for various items of work involved and no additional payments will be allowed.

The Contractor shall coordinate with PG&E for installation of a new utility pole and relocation of PG&E electric lines upon completion of bridge construction. The price paid for coordination with PG&E for relocation of electrical lines is included in the price paid for various items of work involved and no additional payments will be allowed.

For PG&E, contact Zikarra Jobe, Senior New Business Representative, at 707-492-2831, or at ZAJ1@pge.com.

MMWD has completed installation of the new 6" water line on Southern Heights Boulevard and abandoned the existing water line mounted on the bridge. Removal and disposal of the existing water line on the bridge is the responsibility of the City's Contractor. The price paid for removal of existing water lines is included in the price paid for various items of work involved and no additional payments will be allowed. A new 6" water line will be installed on the bridge as shown on the plans. The City's Contractor will be responsible for installing the new water line and for coordinating with MMWD for service connections and turn on. The lump sum price paid for Water Line Installation includes all labor and materials to furnish and install the new 6" water line, as shown on the plans, as directed by the Engineer, and no additional payments will be allowed.

For MMWD, contact Andrew Mitchell, MMWD Field Supervisor, at 415-945-1153.

The Contractor shall coordinate with AT&T and Comcast for the relocation of their facilities to the new permanent utility pole to be installed by PG&E prior to the completion of bridge construction. The price

paid for coordination with AT&T and Comcast for the relocation of their facilities is included in the price paid for various items of work involved and no additional payments will be allowed.

For AT&T, contact Michael McAfee, AT&T North Coast Engineering Public Works Coordinator, at 415-499-4900, or at mm1429@att.com.

For Comcast, contact Paul Alabona, CableCom Bay Area New Build Manager, at 707-759-4070 x 267, or at paul.alabona@cablecomllc.net.

18-1.06 SUBMITTALS

Contractor shall submit a progress schedule for all work. The schedule shall include mobilization, the sequence of operation, and a project completion date. No work shall commence until a progress schedule and methods have been approved. **Once the work begins, the Contractor shall submit an updated weekly schedule every Thursday by noon.** The Contractor shall submit a schedule in a format acceptable to the engineer. The schedule shall show the controlling item of work. If, in the opinion of the engineer, the work being performed does not match the schedule or there is a discrepancy in the schedule the Contractor shall revise the schedule to represent the work being performed including the controlling item of work and the proposed completion date. **The Contractor shall assume that the City, City's Field Inspector, and contracting team, including appropriate subcontractors, will meet each week at a mutually agreed upon time and location to review the progress schedule and any other construction related documents, including but not limited to, material submittals, request for information (RFIs), etc.**

The Contractor shall submit via email one electronic PDF of each submittal for review by the City. Except as otherwise provided in the Technical Specifications, the Contractor shall allow five (5) working days after submittals are furnished to the Engineer for review. See individual sections for submittal requirements included in, but not limited to the following sections:

1. Progress Schedule, Traffic Control, Pedestrian Access, and Stage Construction Plan
2. Storm Water Pollution Prevention Plan
3. Water Pollution Control Plan
4. Spill Prevention and Countermeasure Plan
5. Temporary Wall, and Temporary Shoring and Bracing Plans
6. Potholing Results
7. As-built Plans
8. Hot Mix Asphalt Design
9. Aggregate Base Design
10. Concrete Mix Design
11. Daily reports and shaft foundation record reports
12. Electrical Materials (lighting fixtures, conduit, conductors, pull box, etc.)
13. Bridge Railings
14. Roadway Barrier Railing
15. Gravity Block Retaining Wall
16. Buy America Certificates of Compliance
17. Any other items required by the City

The Contractor shall furnish to the City Certificates of Compliance for all metal products (i.e. steel reinforcement, bridge railing, roadway barrier railing, lighting fixtures, etc.) indicating conformance to all Buy America requirements. Should a material or any element of construction requiring conformance with Buy America requirements be found non-compliant, the Contractor shall immediately notify the Engineer and make any and all necessary corrections.

18-1.07 AS-BUILT PLANS

Upon completion of the work, the Contractor shall furnish to the City a complete set of as-built plans showing all changes or deviations from the plans taking care to note the location of objects not installed at the location shown on the plans. Improvements will not be accepted by the City for permanent maintenance until the Contractor has submitted all as-built plans to the Engineer. The as-built plans shall conform to the following:

1. The plans must be stamped or otherwise noted "AS-BUILT," be 22"x34" in size, and be neat, clear, and readable.

2. On the signing and striping plan sheet, the dates of signing/striping removal, relocations, or installations must be shown on the as-built.

3. As-built plans must contain the encroachment permit number, County, Route, and Post Mile on each sheet. Additionally, as-built plans must contain the contractor's name, permanent address, date prepared, and signature.

4. Disclaimer statements of any kind that differ from the obligations and protections provided by Sections 6735 through 6735.6 of the California Business and Professions Code must not be included on the as-built plans. Such statements constitute non-compliance with the encroachment permit requirements.

18-1.08 PRIVATE PROPERTY ACCESS

Notify the Engineer and each property owner in writing 30 calendar days before doing any work within areas denoted on the plans as Temporary Construction Easement (TCE) and again 72 hours by the phone to each property owner before the start of construction.

Provide date stamped photo documentation of the private property before work within the TCEs.

All work performed within the private property, including maintaining the defensible space for fire protection before, during, and after construction shall conform to all applicable building, fire and sanitary laws, ordinances, and regulations relating to such work.

Install suitable safeguards to preserve and protect facilities including trees, fencing, landscaping, culverts, irrigation facilities from damage per section 12.09, "Preservation of Property," of the General Provisions.

If the facilities are damaged by your operations, you must repair or restore the facilities as good as when you entered the TCE at your expense. Repair or restore facilities per section 10.14, "Restoration of Injured Property," of the General Provisions.

Apply erosion control measures as directed by the Engineer within the easement area to control soil disturbances resulting from construction activities.

The following paragraphs include specifications for work within each TCE parcel:

Assessor's Parcel Number 012-282-17

Remove the three standing eucalyptus trees and one fallen eucalyptus tree as shown in the executed TCE Agreement or as directed by the Engineer. Trees that are removed shall have their stumps and root structure left in place to provide slope stability unless in conflict with the proposed improvements on the plans in which case the stump or roots in conflict must be removed.

You are required to make the owner of the property an additional named insured on the general liability policy and confirm in writing that the general liability policy does not have an erosion exclusion.

Assessor's Parcel Number 012-282-36

Maintain any tree and vegetation replacements for a period of two years after planting. The maintenance of the plants shall conform to section 20-4, "Plant Establishment Work," of the State Standard Specifications.

All entry shall be from the bridge side of the property. Request in writing if access is required from the home side of property (Pleasant Lane).

You are required to make the owner of the property an additional named insured on the general liability policy and confirm in writing that the general liability policy does not have an erosion exclusion.

Assessor's Parcel Number 012-282-37

Maintain any tree and vegetation replacements for a period of two years after planting. The maintenance of the plants shall conform to section 20-4, "Plant Establishment Work," of the State Standard Specifications.

All entry shall be from the bridge side of the property. Request in writing if access is required from the home side of property (Pleasant Lane).

You are required to make the owner of the property an additional named insured on the general liability policy and confirm in writing that the general liability policy does not have an erosion exclusion.

Assessor's Parcel Number 012-282-40

Maintain any tree and vegetation replacements for a period of two years after planting. The maintenance of the plants shall conform to section 20-4, "Plant Establishment Work," of the State Standard Specifications.

All entry shall be from the bridge side of the property. Request in writing if access is required from the home side of property (Pleasant Lane).

Assessor's Parcel Number 013-124-06

Restoration work to the damaged facilities include the re-establishment of portion of wooden fence and reconstruct the entry pathway to match the grade of the new bridge.

Assessor's Parcel Number 013-124-07

Reconstruct the existing wooden deck access that connects the existing gate to the bridge. The portion of the wood deck access behind the gate shall remain "as is" and will not require entry unless it need to be replaces as directed by the Engineer. Notify the owner 24-hour in advance if entry through the wood deck access behind the gate is needed.

Perform tree limb pruning for the tree within the TCE as specified in the executed TCE Agreement. All pruning shall be done per the direction of a licensed arborist. All pruning shall be done from the City right of way, where feasible.

Assessor's Parcel Number 013-132-01

Rehabilitate the asphalt pavement in the driveway as shown or as directed by the Engineer.

18-1.09 WORK INCLUDED UNDER PAY ITEMS

Where an item is listed as a pay item in the Prices of Items, the lump sum or unit price quoted shall be considered as full compensation for furnishing all labor, materials, tools, equipment, incidentals and doing all the work necessary, including final cleanup, to construct the pay item complete in place as shown on the plans and specified in these specifications.

It is the intention herein that all items of work required by these plans and specifications are included in the Prices of Items. Items of work not so included will be deemed fully compensated for in the price quoted for each respective item set forth that is most closely associated with the work required and no additional compensation will be allowed therefore.

18-1.10 MEASUREMENT AND PAYMENT

Full compensation for all requirements of this section including but not limited to schedule preparation and updates, cooperation with property owners and residents, utility coordination, potholing all utilities, backfilling potholed areas, working around existing obstructions, dewatering, submittals, maintaining defensible space inside TCE areas per the San Rafael Fire Department requirements, and all other items considered in this section shall be considered as included in the prices paid for the various items of work involved and no additional payment will be allowed therefore.

The Contractor shall not be entitled to any right of way delay for delays caused by the utility relocating the potholed utilities. Proper time extension to the contract will be allowed for any delays associated with utility relocations.

18-2 MOBILIZATION

18-2.01 GENERAL

The work to be performed under this item includes, but is not limited to, furnishing all labor, equipment, and materials necessary to bring a construction force to full operation on the job site. Work includes, but is not limited to, preparation of access routes to the job site, protection of existing facilities, movement of personnel, equipment, supplies, incidentals, coordination with the City, storm water and non-stormwater management, and environmental stewardship. This section also includes all necessary permits required by the Contractor.

18-2.02 DEVELOP WATER SUPPLY

Developing a water supply and applying watering shall conform to the provisions in Section 15, Water of the General Provisions, Section 17, "Watering," of the Standard Specifications and these Technical Specifications.

The Contractor shall coordinate with Marin Municipal Water District (MMWD) to obtain a Hydrant Meter Use Permit for all water on the project or shall bring water to the site using his own forces. If a hydrant meter is desired, the Contractor shall complete and submit an application to MMWD (see Appendix C for the application). In no case shall the Contractor use water from a garden hose, or other water source, owned and paid for by a private property owner.

Compensation for any required labor, materials, tools, equipment, fees or incidental costs for developing a sufficient supply of water and furnishing pipe lines or other necessary equipment to supply water to the water application equipment for all water required for the work, and adherence to all specified requirements is considered as included in the lump sum price bid for Mobilization and no additional compensation will be allowed therefor.

18-2.03 CONSTRUCTION SITE MANAGEMENT

Construction Site Management shall conform to the requirements included in the General Provisions, Section 13-4, “Job Site Management,” of the State Standard Specifications, and these Technical Specifications.

The contractor shall prepare a Spill Prevention and Countermeasure Plan (SPCP) and submit the SPCP to the City for review and approval prior to the commencement of construction activities. The SPCP shall include information on the nature of all hazardous materials that would be used on-site. The SPCP shall also include information regarding proper handling of hazardous materials, and clean-up procedures in the event of an accidental release. The phone number of the agency overseeing hazardous materials and toxic clean-up shall be provided in the SPCP.

The following measures shall be implemented throughout the construction period to reduce the potential risk associated with fire hazards:

- All construction workers shall undergo fire prevention training prior to working on the site. The training shall describe fire prevention practices included below.
- Upon notification from the City Fire Department that a “Red Flag Warning – High Fire Danger Alert” exists for the City, the contractor shall suspend any construction activities involving powered mechanical equipment and shall limit motorized vehicle access to construction staging areas.
- The contractor shall maintain fire suppression equipment, including water pumpers and fire extinguishers onsite and on trucks and tractors.

- The contractor shall maintain communication equipment, including cell phones and radios on site during construction to allow for rapid contact of emergency responders.
- The contractor shall implement the following measures to reduce risk of fire resulting from the use and storage of fuel:
    - Refuel power equipment or tools in a cleared space;
    - Store fuel in a cleared space and, where possible, in the shade;
    - Turn off equipment while fueling;
    - Use a gas spout/funnel to avoid spills; and
    - Remove or dry any spilled fuel prior to starting equipment.

18-2.04 WATER POLLUTION CONTROL

This work includes preventing, controlling and abating storm water pollution from entering the City of San Rafael's Municipal Separate Storm Water System and other natural waters. Contractor shall refer to Section 12.04, Storm Water Pollution Prevention of the General Provisions, Section 13, "Water Pollution Control" of the State Standard Specifications, and Appendix A, City of San Rafael Pollution Prevention Requirements, of these Technical Specifications.

18-2.04A PREPARE STORM WATER POLLUTION PREVENTION PLAN

Water pollution control shall conform to the provisions in Section 13-3, "Storm Water Pollution Prevention Plan" of the State Standard Specifications and these Technical Specifications.

The Storm Water Pollution Prevention Plan (SWPPP) is subject to review from the following RWQCBs:

1. San Francisco Bay Regional Water Quality Control Board

The project is Risk Level 2.

18-2.04B PREPARE WATER POLLUTION CONTROL PLAN

The Contractor shall develop and implement a Water Pollution Control Plan (WPCP) in order to filter water from the construction site. The Contractor shall be responsible for implementing and managing these systems during the life of the project. The WPCP shall conform to all applicable requirements in Section 13-2, "Water Pollution Control Program," of the State Standard Specifications and Appendix A of these Technical Specifications. **The WPCP shall be prepared by a Qualified SWPPP Developer (QSD).** The Contractor shall use the WPCP template available on Caltrans web site at http://www.dot.ca.gov/hq/construc/stormwater. Submittal of Best Management Practices (BMPs) by themselves will not be accepted. **A WPCP shall be submitted to and approved by the Engineer prior to construction activity.**

All water encountered in constructing roadway improvements or storm drain pipes, manholes and catch basins shall be disposed of by the Contractor in such manner as will not damage the public or private property or create a nuisance or health menace. The Contractor shall furnish, install, and operate pumps, pipes, appliances, and equipment of sufficient capacity to keep all excavations and accesses free from water until the excavation is backfilled, unless otherwise authorized by the Engineer. The Contractor shall provide all means or facilities necessary to conduct water to the pumps. Filtered water, if odorless and stable, may be discharged into and existing storm drain, channel, or street gutter in a manner approved by the Engineer. When required by the Engineer, a means shall be provided for desilting the water before discharge.

18-2.05 ENVIRONMENTAL PROTECTIONS

Environmental protections shall conform to the requirements included in the General Provisions, Section 14, "Environmental Stewardship," of the State Standard Specifications and these Technical Specifications.

18-2.05A AIR QUALITY AND NOISE

Consistent with the Basic Construction Mitigation Measures required by the Bay Area Air Quality Management District (BAAQMD), the following actions shall be incorporated into construction contracts and specifications for the Project:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day with reclaimed water, if available.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt tracked out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible.
- Structural pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- A publicly visible sign shall be posted with the telephone number and person to contact at the City of San Rafael regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.
- The City and/or the Project contractor shall require all off road diesel-powered construction equipment of greater than 50 horsepower used for the Project meet the California Air Resources Board Tier 4 emissions standards.

The proposed Project shall comply with the City of San Rafael Code of Ordinances Section 8.13.050 by ensuring that construction activities only occur between the hours of 7:00 AM and 5:00 PM Monday through Friday and 9:00 AM and 5:00 PM on Saturdays, when approved by the Engineer, and that the noise level at any point outside of the property plane of the project would not exceed 90 dBA.

The construction contractor shall permit only two pieces of construction equipment to operate at any single time within 100 feet of the western boundary of the Project site. This strategy would reduce the construction noise level to meet the City's construction noise standard of 90 dBA Lmax outside of the property plane of the Project.

The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from boundaries of the Project site.

The construction contractor shall also locate equipment staging in areas that will create the greatest possible distance between construction-related noise sources, Project site boundaries, and noise sensitive receptors nearest the Project site during all Project construction.

The contractor shall ensure that all construction equipment is equipped with manufacturers approved mufflers and baffles.

Full compensation for all requirements of this section shall be considered as included in the prices paid for the various items of work involved and no additional payment will be allowed therefore.

18-2.05B ARCHEOLOGICAL AND CULTURAL RESOURCES

If any archaeological or paleontological deposits are encountered, all work within 25 feet of the discovery shall be redirected and a qualified archaeologist contacted, if one is not present, to assess the situation, consult with agencies as appropriate, and make recommendations for the treatment of the discovery. The City of San Rafael shall also be notified. Project personnel shall not collect or move any archaeological materials.

Any adverse impacts to the finds shall be avoided by Project activities. If avoidance is not feasible, the archaeological deposits shall be evaluated to determine if they qualify as a historical resource or unique archaeological resource, or as historic property. If the deposits do not so qualify, avoidance is not necessary. If the deposits do so qualify, adverse impacts on the deposits shall be avoided, or such impacts shall be mitigated. Mitigation may consist of, but is not limited to, recovery and analysis of the archaeological deposit; recording the resource; preparing a report of findings; and accessioning recovered archaeological materials at an appropriate curation facility. Educational public outreach may also be appropriate. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results and provide recommendations for the treatment of the archaeological deposits discovered. The report shall be submitted to the City of San Rafael.

In the event that human remains are encountered, work within 50 feet of the discovery shall be redirected and the Marin County Coroner notified immediately. At the same time, a qualified archaeologist shall be contacted to assess the situation and consult with agencies as appropriate. Project personnel shall not collect or move any human remains and associated materials. If the human remains are of Native American origin, the coroner shall notify the Native American Heritage Commission within 24 hours of this identification. The Native American Heritage Commission shall identify a Most Likely Descendant (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. Upon completion of the assessment, the archaeologist shall prepare a report documenting the methods and results and provide recommendations of the treatment of the human remains and any associated cultural materials, as appropriate and in coordination with the recommendations of the MLD. The report shall be submitted to the City of San Rafael.

If paleontological resources are encountered during Project subsurface construction and no monitor is present, all ground disturbing activities shall be redirected within 50 feet of the find until a qualified paleontologist can be contacted to evaluate the find and make recommendations. If found to be significant and proposed Project activities cannot avoid the paleontological resources, a paleontological evaluation and monitoring plan, as described above, shall be implemented. Adverse impacts to paleontological resources shall be mitigated, which may include monitoring, data recovery and analysis, a final report, and the accession of all fossil material to a paleontological repository. Upon completion of Project ground disturbing activities, a report documenting methods, findings, and recommendations shall be prepared and submitted to the paleontological repository.

Full compensation for all requirements of this section shall be considered as included in the prices paid for the various items of work involved and no additional payment will be allowed therefore.

18-2.05C TEMPORARY FENCE (TYPE ESA)

Temporary fence (Type ESA) shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these Technical Specifications and as directed by the Engineer.

Except as otherwise specified in this section, temporary fence shall conform to the plan details and the specifications for permanent fence of similar character as provided in Section 80, "Fences," of the State Standard Specifications.

Used materials may be installed provided the used materials are good, sound and are suitable for the purpose intended, as determined by the Engineer.

Materials may be commercial quality provided the dimensions and sizes of the materials are equal to, or greater than, the dimensions and sizes shown on the plans or specified herein.

Posts shall be either metal or wood at the Contractor's option.

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

Temporary fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

When no longer required for the work, as determined by the Engineer, temporary fence shall be removed.

Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Removed temporary fence materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fence.

Holes caused by the removal of temporary fence shall be backfilled in conformance with the provisions in the second paragraph of Section 15-1.02, "Preservation of Property," of the Standard Specifications.

Temporary fence (Type ESA) will be measured and paid for in the same manner specified for permanent fence of similar character as provided in Section 80, "Fences," of the State Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence (Type ESA) shall be considered as included in the contract prices paid per linear foot for temporary fence and no additional compensation will be allowed therefor.

18-2.06 TEMPORARY SITE ACCESS IMPROVEMENTS

Contractor shall be responsible for temporary site access improvements, as needed, to access and construct the project improvements. Details for temporary site access roads and walls shown on the Plans are for information purposes only to provide the Contractor with a suggested method for access to the site. The Contractor’s means and methods may differ from the Plan and are subject to approval by the Engineer.

18-2.06A TEMPORARY RETAINING WALLS

Retaining structures, consisting of temporary retaining walls at the project site, shall conform to these Technical Specifications.

Attention is directed to "Precast Concrete Quality Control" of these Technical Specifications.

Attention is directed to "Order of Work" and "Maintaining Traffic" of these Technical Specifications regarding the construction sequences.

The temporary retaining wall may be of conventional construction or Mechanically Stabilized Embankment (MSE) wall construction. No architectural treatment is required.

The Contractor shall be responsible for designing, construction, and maintaining safe and adequate temporary walls to rigidly retain the roadway sections and underlying embankments during stage construction. Temporary walls shall support all loads imposed including construction equipment loads and traffic loads. Traffic loads shall consist of HS20-44 and alternative and permit design loads as noted on the plans and designed for a minimum service life of 5 years.

When no longer required as determined by the Engineer, temporary walls shall be removed to a depth of not less than 3 feet below final grade. Removal of Temporary Wall shall not damage soil reinforcement or structural backfill of structures.

Any timber for temporary walls which is left in place shall be treated in conformance with Section 58, "Preservative Treatment of Lumber, Timber, and Piling," of the State Standard Specifications, and the requirements for use in AWPA Use Category System: UC4B, except that chromated copper arsenate and creosote shall not be used. Removed portions of temporary walls shall be disposed of outside of the highway right of way as provided in Section 14-10, "Solid Waste Disposal and Recycling," of the State Standard Specifications.

Soil reinforcement for temporary walls shall be placed horizontally in lifts that are vertically spaced such that there is a minimum 6 inches of compacted soil between the layers of soil reinforcement.

Limits and construction of Temporary Walls in no way change the requirements, measurements or payment limits for Structural Backfill for bridge abutments.

Approval by the Engineer of the temporary wall drawings or temporary wall inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for the temporary walls.

The contractor shall submit to the Engineer detailed plans for each temporary wall. Temporary wall plans, including temporary shoring and bracing, shall conform to the requirements Section 5-1.02A, 'Excavation Safety Plans," of the State Standard Specifications, except that plans shall be prepared and signed by an engineer who is currently registered as a Civil Engineer in the State of California, and the plans and design calculations shall be submitted at least 6 weeks before the Contractor intends to begin any construction activities related to said temporary wall. The temporary wall working drawings shall include descriptions and values of all loads to be imposed, including construction equipment loads, traffic loads, traffic barrier loads, as needed, soil properties utilized, system design calculations that demonstrate adequate stability of the protective system, and another design calculations used in the preparation of the plans.

The Contractor shall provide the required compaction in steps in the area around the temporary walls in conformance with the requirements in Section 19, "Earthwork," of the State Standard Specifications.

Temporary shoring and bracing may be required at other locations not shown on the plans or specified herein.

Temporary retaining walls, including any shoring and bracing needed for construction, will not be measured or paid for separately. Full compensation for all requirements of this section shall be considered as included in

the lump sum price paid for Temporary Site Access Improvements and no additional payment will be allowed therefore.

18-2.06B TEMPORARY STRUCTURE BACKFILL

The work consists of obtaining backfill material for temporary retaining wall construction in conformance with the provisions in section 19-3 "STRUCTURE EXCAVATION AND BACKFILL," of the State Standard Specification and these Technical Specifications.

Temporary structure backfill, including hauling, installation, maintenance, removal and disposal by the Contractor, will not be measured or paid for separately. Full compensation for all requirements of this section shall be considered as included in the lump sum price paid for Temporary Site Access Improvements and no additional payment will be allowed therefore.

18-2.06C GRAVEL FOR TEMPORARY CONSTRUCTION ACCESS

Gravel for temporary construction access shall comply to the requirements of Class 2 Aggregate Base as described elsewhere in these Technical Specifications.

Gravel for temporary construction access, including hauling, installation, maintenance, removal and disposal by the Contractor, will not be measured or paid for separately. Full compensation for all requirements of this section shall be considered as included in the lump sum price paid for Temporary Site Access Improvements and no additional payment will be allowed therefore.

18-2.06D DRAINAGE FOR TEMPORARY CONSTRUCTION ACCESS

Drain pipes needed for temporary construction access shall comply to the requirements of Drain Pipes as described elsewhere in these Technical Specifications.

Drainage for temporary construction access, including hauling, installation, maintenance, removal and disposal of materials by the Contractor, will not be measured or paid for separately. Full compensation for all requirements of this section shall be considered as included in the lump sum price paid for Temporary Site Access Improvements and no additional payment will be allowed therefore.

18-2.07 MEASUREMENT AND PAYMENT

Mobilization shall be measured and paid for on a lump sum (LS) basis. Compensation for Mobilization shall be limited to a maximum of ten percent (10%) of the total bid. The lump sum price paid for mobilization shall include full compensation for furnishing all labor, materials, tools, equipment and incidental, and for doing all work involving in mobilization as specified in these Technical Specifications, the State Standard Plans and Specifications and as directed by the Engineer, and no additional payment will be allowed therefore. The rate of payout of mobilization is set forth in the Public Contract Code.

No adjustment of compensation will be made for the lump sum item of Mobilization for increase or decrease in the quantity of water required, regardless of the reason for such increase or decrease. The provisions in Section 4-1.03, "Changes," of the State Standard Specifications shall not apply to the item of Mobilization.

The contract lump sum price paid for Construction Site Management includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in spill prevention and control, including preparing the Spill Prevention and Countermeasure Plan , material management, waste management, non-stormwater management, and dewatering activities, including identifying, sampling, testing, handling, and disposing of hazardous waste resulting from your activities,

as shown on the plans, as specified in the State Standard Specifications and these Technical Specifications, and as ordered by the Engineer, and no additional payment will be allowed therefore.

The contract lump sum price for Prepare Storm Water Pollution Prevention Plan includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in in developing and implementing a SWPPP, including providing a WPC manager, conducting water pollution control training, and monitoring, inspecting and correcting water pollution control practices at the job site, in reporting on stormwater quality per storm events and qualifying rain events, including preparation, collection, analysis of stormwater samples for pH, turbidity, and other constituents, in preparing REAPs, including preparing and submitting REAP forms, and monitoring weather forecasts, in preparing and submitting storm water annual reports, including annual certifications, monitoring reports, inspection, and sampling results, and obtaining acceptance of storm water annual, as specified in the Standard Specifications and these Technical Specifications, and as ordered by the Engineer. A single day of sampling is counted as 1 unit.

The contract lump sum price paid for Water Pollution Control Program includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing, maintaining and removing and disposing of temporary BMPs, including temporary fiber rolls, temporary silt fences, temporary check dams, temporary construction site entrance, and temporary concrete washout, not including temporary fence (Type ESA) and temporary retaining wall, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the State Standard Specifications and these Technical Specifications, and as directed by the Engineer, and no additional payment will be allowed therefore.

Temporary Fence (Type ESA) is measured by the linear foot along the centerline of the installed fence.

The contract price paid per linear foot for Temporary Fence (Type ESA) includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing and maintaining the temporary fence, complete in place, including removal of materials, cleanup and disposal of retained sediment and debris, and backfilling and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the State Standard Specifications and these Technical Specifications, and as directed by the Engineer, and no additional payment will be allowed therefore.

The contract lump sum price paid for Temporary Site Access Improvements includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing, maintaining and removing and disposing of temporary site access improvements, including temporary retaining walls, gravel, and drain pipes, complete in place, including removal and disposal of materials, and repairing holes, depressions and other ground disturbance, as shown on the plans, as specified in the State Standard Specifications and these Technical Specifications, and as directed by the Engineer, and no additional payment will be allowed therefore.

18-3 SIGNS AND TRAFFIC CONTROL

18-3.01 GENERAL

Signs and Traffic Control shall consist of closing traffic lanes and paths in accordance with the provisions of Section 12, "Temporary Traffic Control," of the State Standard Specifications, the provisions under "Maintaining Traffic" of the Standard Plans, these Technical Specifications, and the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD).

The Contractor is referred to Section 18-13, Traffic Stripes and Pavement Markings, for additional requirements associated with temporary striping and pavement markings, if required.

It is the Contractor's responsibility to provide safety with the least possible inconvenience to vehicular and pedestrian traffic during construction. **It is assumed that Southern Heights Boulevard will be closed to vehicular traffic for the duration of construction from the driveway of 108 Southern Heights Blvd to the bridge with the sole exception that the property owners at 116 Southern Heights will have drivable access to their driveway unless stated otherwise in these Technical Specifications. No other section of Southern Heights Blvd may be fully closed without written authorization from the Engineer. The Contractor shall provide a continuous path of travel for pedestrians and vehicles to homes on the east side of the bridge at all times.**

Contractor shall be responsible for all warning and detour signs. An adequate number of flag persons shall be employed to direct traffic around construction zones and to respond to unexpected traffic problems. If in the opinion of the Engineer additional flag persons or traffic control devices are needed at the site or surrounding neighborhood, the Contractor shall provide the necessary measures at no additional cost to the City. It shall be understood by the Contractor that field modifications are needed to fit field conditions which sometimes change during the project.

The Contractor shall assume for the purposes of bidding that three changeable message signs (CMS) may be deployed concurrently beginning at least two weeks prior to the commencement of construction activity until project completion. Additional changeable message signs required by the City shall be included in the contract at the Contractor's expense. Approximate locations of CMS boards include the intersections of D St/Meyer Rd and Octavia St/Martens Blvd. A third CMS board may be deployed following the start of construction at the discretion of the City.

The provisions in this section will not relieve the Contractor from his responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.04, "Public Safety," of the State Standard Specifications.

The Contractor shall be solely responsible for pedestrian and vehicular movement through the project area and shall assume full liability for any and all claims arising out of the construction of the project, including but not limited to claims for personal injury, damage to existing structures, loss of business, etc. The Contractor shall agree to hold the City and all its employees, representatives and consultants harmless from any and all such claims. No additional compensation shall be paid for any work that has to be performed outside normal working hours as a result of these Technical Specifications.

18-3.02 PUBLIC ACCESSIBILITY

The Contractor shall properly secure the project site at all times using whatever means and methods are necessary, including but not limited to, security fencing, barricades, video cameras, etc. to prohibit public access through the site, with the exception of property owners whose properties front the bridge. The Contractor shall provide walking access to adjacent properties at all times. The Contractor shall maintain access to properties even after hours for the life of the construction. Temporary access ramps shall be

installed to maintain access and shall be shown on the Contractor's staging plan, if deemed necessary by the Engineer.

The Contractor shall be responsible for designing working drawings, constructing and providing a safe and adequate continuous, accessible and safe path of travel around or through localized construction work zones and to each building, business and property utilized by the public. The Contractor shall use temporary asphalt, aggregate base, wood/metal ramps, signs, cones, barricades, flashers, and flaggers to direct and channel the public during and after construction. All proposed closures of a pedestrian access path shall be submitted in writing to the Engineer for review and approval. Advance warning shall be provided to the public should an access path be closed. All safe paths of travel shall be in compliance with applicable Americans with Disabilities Act Accessibility Guidelines (ADAAG), Americans with Disabilities Act (ADA) regulations and the California Manual on Uniform Traffic Control Devices (CAMUTCD).

Materials

Materials used for public accessibility during construction includes, but is not limited to:

- Temporary Hot-mix Asphalt Concrete (cut back asphalt concrete not permitted)
- Temporary Wood Ramp
- Aluminum Modular Ramps. EZ-Access, or approved equal.
- Contact info: www.ezaccess.com, Phone 800-451-1903.
- Four (4) foot wide minimum walking surface with running slope not to exceed eight (8) percent.
- Barricade materials: Delineators, A-Frames, Barrier Caution Tape, Fencing Material
- Non-skid tape
- Four (4) inch timber, or equivalent, at the bottom of any railing to provide for the sight impaired

Installation

Temporary ramps shall be constructed so installation and removal will not damage existing pavement, curb and/or gutter.

Ramps shall have a minimum four (4) foot wide walking surface and a running slope not to exceed eight (8) percent.

Ramps shall meet existing surfaces without gaps. When required for drainage, a Schedule 40 PVC pipe, with minimum 2-inch diameter, shall be installed under or through ramp in gutter or flow line.

Transitions between ramps and the street or sidewalk surfaces shall be smooth.

Sides of the ramp shall be protected where drop-offs exceed six (6) inches.

Ramps shall be provided to the public leading to businesses. Ramps at the corners of the intersections shall be made of temporary AC pavement to ensure that a smooth transition is provided for the public as well as auto traffic. All temporary wooden ramps shall be maintained throughout the construction project. The Contractor shall maintain the structural integrity of the ramps. No loose, splintered boards or nails will be acceptable.

Maintenance of a Clear and Accessible Public Corridor

The Contractor shall maintain a four (4) foot accessible corridor that provides at least one safe path of travel for the public at all times for the duration of the project. Conversely, if a safe path of travel is not available, the Contractor shall post the sidewalk as being closed, however, access must still be maintained to each business. Signage shall be placed at the location of closure as well as the next intersection in both directions, advising of the closure but noting that access is still available to all businesses. All proposed closures of a pedestrian access path shall be submitted in writing to the Engineer for review and approval.

The Contractor shall provide a path to the businesses and residents, using aggregate base to backfill, after demolition of the concrete sidewalk, curb and gutter. The aggregate base shall be firmly packed to establish a safe and ADA compliant path, along the entire work zone.

Installation of Barricades

Barricades, including Type K Concrete Barriers and Type II Barricades, which will provide protection for the public from traffic or construction operations, shall be installed in the following locations:

- Between the access route and any adjacent construction site.
- Between the alternate circulation path and any adjacent construction site.
- Between the alternate circulation path and the vehicular way, if the alternate circulation path is diverted into the street.
- Between the alternate circulation path and any protruding objects, drop-offs, or other hazards to the public.
- At the down curb ramp of an intersection, if opposite up curb ramp is temporarily or completely blocked, and no adjacent alternative circulation path is provided.

Concrete Barrier (Type K) shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these Technical Specifications and as directed by the Engineer.

Except as otherwise specified in this section, Concrete Barrier (Type K) shall conform to the plan details and the specifications for Concrete Barrier (Type K) as provided in Section 12-3.20, "Type K Temporary Railing," of the State Standard Specifications.

Surfacing of Public Corridors

During construction, tripping hazards and barriers must be removed to maintain an accessible safe path of travel. The surface of the path of travel shall be skid resistant and free of irregularities.

Opened crosswalks, ramps and walkways in general shall be kept free of debris and obstructions.

Identification of Safe Path of Travel

If alternate circulation routes are provided for the public to bypass the construction site, the route shall be clearly defined and advance warning shall be provided to clearly delineate the alternate circulation route. Any change of level in a path of travel that is over ¼ inch (1/2" maximum) height must be beveled at 45 degrees to provide a smooth, non-tripping transition. The Engineer shall review and approve any public access limitations and notification requirements for pedestrians with mobility or vision impairments.

When using A-frames for defining a path of travel, A-frames shall be placed end to end (no spacing between barricades) to provide a continuous guide for individuals using canes. A-frames shall be connected with 2x4's that are continuous and are attached to the base of the barricade system at two (2) to four (4) inches from the ground.

Caution tapes shall not be used as barricades or to define a path of travel but may be used to highlight danger or in conjunction with barricades. Excavated areas shall be secured by means of barricades or temporary fences.

The bottom three (3) inches of any fencing material used shall be made solid to act as a guide for canes used by the visually impaired. Wood, sheet metal, railings, or other approved material may be used at the bottom portion of the fence.

No trucks or equipment shall be parked or obstructing the public path of travel at any time.

Warning Signs
The Contractor shall provide warning signs for temporary ramps and barricades. Warning signs shall be located at both the near side and the far side of the intersection preceding a temporarily completely blocked public way.

Restoration of Public Routes
After construction, the site shall be restored to its former condition, or new condition as required.

18-3.03 NO PARKING SIGNS

The Contractor shall be provided with temporary, City furnished, "NO PARKING" signs, which he must post in the construction zone (72) hours prior to commencing operations. The posting must be witnessed by the San Rafael Police Department twenty-four (24) hours prior to towing. It shall be the Contractor's responsibility to ensure the signs and barricades are maintained overnight and on weekends. The signs shall be preserved and re-used throughout the duration of the project. Dates and times of parking restrictions shall be clearly indicated on the signs.

1. Availability

Upon approval of materials and before commencement of work, the City shall furnish the Contractor with twenty-five (25) "No parking-Tow Away" signs. The Contractor shall take steps to protect and preserve these signs so that they will remain usable throughout the full term of the job. Additional signs shall be provided as needed.

Only City issued signs, or approved equals, may be used.

2. Placement

While the minimum distance between signs shall be 200 feet, the signs shall be placed so that they are:

a) Easily visible/readable to any individual standing within 100 feet of a sign;
b) Visible/readable from any vehicle parked within 100 feet of a sign; or
c) As directed by the Engineer or San Rafael Police Department.

Signs, once posted, shall be maintained until no longer required and then salvaged. It shall be the responsibility of the Contractor to make sure that the signs remain posted until no longer required and are protected from vandalism or removal. If time between construction phases exceeds two days, including non-working days, all no parking signs shall be removed.

3. Authority and Enforcement

Once posted, the Contractor shall notify the San Rafael Police Department as to the location and limits of such signs.

The Police Department will then, at their earliest convenience, dispatch an officer who will verify and log the location and limits. No less than twenty-four (24) hours after said entry is made, autos may be towed from the location, under the immediate direction of a Police Officer, provided that the signs have be properly maintained.

4. Costs - Payment - For Signs

All costs (except purchase or charges related to lost signs), labor, equipment charges, etc., incurred in accordance with this section shall be considered to be included in the lump sum price paid for Signs and Traffic Control.

18-3.04 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in accordance with the provisions in Section 12, "Temporary Traffic Control," of the State Standard Specifications, the latest edition of the California Manual on Uniform Traffic Control Devices, and these Technical Specifications.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least two working days, but not more than 14 calendar days, prior to commencing any excavation for construction area sign posts. The regional notification centers include but are not limited to the following:

Notification Center
Underground Service Alert - Northern California (USA)
1(800)227-2600

All excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes.

Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic as specified under "Prequalified and Tested Signing and Delineation Materials" elsewhere in these Technical Specifications.

Type IV reflective sheeting for sign panels for portable construction area signs shall conform to the requirements specified under "Prequalified and Tested Signing and Delineation Materials" elsewhere in these Technical Specifications.

18-3.05 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall be fully responsible for accidents to the public and or damage to public and private property on the site of the work.

The Contractor shall give special attention to provide continuous and uninterrupted access to and from the residences on and adjacent to the work. The Contractor shall schedule and pursue his operations in such a manner that undesirable construction conditions will be minimized.

The Contractor shall provide watchpersons and flagpersons as well as provide and maintain fences, barriers, guardrails, and other safety devices adjacent to and on the site at or near all barriers as may be necessary to control traffic and prevent accidents to the public. The Contractor shall furnish, place, and maintain such devices as set forth in the current "Manual of Traffic Control for Construction and Maintenance Work Zones," issued by the California Department of Transportation. Flagpersons, while on duty, shall perform their duties and shall be provided with the necessary equipment in accordance with the current "Flagging Instruction Handbook" issued by the California Department of Transportation.

The Contractor shall maintain private entrances and sidewalk areas, and shall construct such detours as may be necessary to properly conduct the work and to provide entrances to private properties at all times. All temporary walking areas shall meet the American with Disability (ADA) requirements for clearances and obstructions. Any temporary paving, covers, etc. shall be constructed and installed in such a manner to meet the ADA requirements. In the event the Contractor fails to meet the ADA requirements, the City of San Rafael may make modifications to the walking areas at the Contractor's expense.

All trenches shall be backfilled at the end of the day or temporary covers shall be maintained during non-working hours to avoid any safety issues for vehicles or pedestrians walking in the project areas.

The Contractor shall make all arrangements with the property owners for the use of private land for detour and construction signs and for any other purpose and shall save the City of San Rafael free from any liability incurred through the use or non-use of such private property.

Upon favorable completion of the work, the Contractor shall remove all signs and traffic control devices from within the project limits to the satisfaction of the Engineer. At the end of the job, all signs, lights, barriers, etc. shall be removed from the construction sites. All sites shall be left clean and orderly.

18-3.06 CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the formal acceptance of the work by the San Rafael City Council, the Contractor shall have charge and care thereof and shall bear the risk of injury or damage to any part thereof and shall bear the risk of injury or damage to any part thereof by the action of the elements or for any other cause, whether arising from the execution or from non-execution of the work.

Existing streets, including haul routes, either public or private, within the work area shall be maintained in safe and orderly conditions at all times. When ordered to do so by the Engineer, any deficiencies shall be immediately corrected to the satisfaction of the Engineer. If the Contractor fails to correct such deficiencies in a timely fashion, the City of San Rafael may have the necessary work performed at the Contractor's expense and/or stop any further work on the project until a safe and orderly condition has been restored. Before completion and acceptance of the work, the Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work required under the contract and shall bear the cost thereof. Inability to obtain labor, materials and/or equipment will not be considered an exception.

18-3.07 MEASUREMENT AND PAYMENT

Signs and Traffic Control shall be measured and paid for on a lump sum (LS) basis. The lump sum price paid for Signs and Traffic Control shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, including but not limited to private property coordination as necessary, preparing and maintaining an adequate traffic control plan, placing, removing, storing, maintaining, moving to new locations, replacing, and disposing of the components of the temporary traffic control measures for pedestrians and vehicular traffic, including construction area signs, k-rails and barricades, as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer.

Full compensation for flagging cost shall be considered as included in Signs and Traffic Control, and no additional compensation will be allowed therefore. The shared cost for providing flagging as specified in Section 12-1.03, "Construction," of the State Standard Specifications, shall not apply to the item of Signs and Traffic Control.

The adjustment provisions in Section 4-1.05 “Changes and Extra Work,” of the State Standard Specifications, shall not apply to the item of Signs and Traffic Control. Adjustments in the compensation for Signs and Traffic Control will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary.

Such adjustment will be made on a force account basis as provided in Section 9-1.04, “Force Account”, of the State Standard Specifications for increased work, and estimated on the same basis in the case of decreased work.

18-4 CONSTRUCTION STAKING

18-4.01 GENERAL

The Contractor shall be responsible for providing construction staking and layout for all work within the project limits. It shall be the responsibility of the contractor to maintain these stakes for as necessary to complete the work shown on the plan and stated herein. Construction surveys and staking shall adhere to the requirements of the 2018 Caltrans Surveys Manual.

The Contractor shall be responsible for providing such stakes and marks a reasonable length of time in advance of starting operations that require such stakes and marks to set the drains, retaining walls, bridge, and any other roadway modification work.

Stakes and marks set by the Contractor's Surveyor or Engineer shall be carefully preserved by the Contractor. In case such stakes and marks are destroyed or damaged, they will be replaced as soon as possible by the Surveyor. The Contractor will be responsible for the cost to replace and restore the stakes and marks.

The Contractor shall be fully responsible for the accuracy of the construction staking. The construction stakes and marks shall be furnished and set with accuracy to assure that the completed work conforms to the lines, grades, and section shown on the Plans. All computations necessary to establish the exact position of the work from control points shall be performed by the Contractor. All computation, survey notes, and other records necessary to accomplish the work shall be neat, legible and accurate. Such computations, notes and other records shall be made available to the Engineer upon request and shall become the property of the City and delivered to the Engineer before acceptance of the project. Construction stakes shall be removed from the site of the work when no longer needed.

It shall be the Contractor's responsibility to notify the Engineer of any discrepancies found between the field conditions and grades and notes shown on the Plans.

18-4.02 MEASUREMENT AND PAYMENT

Full compensation for completing the requirements of this section shall be considered as included in the prices paid for the various items of work involved and no additional payment will be allowed therefore.

18-5 EXCAVATION AND REMOVALS

18-5.01 GENERAL

The work shall consist of removing all objectionable materials from within the project limits, as specified in Section 15, "Existing Facilities" and Section 17-2, "Clearing and Grubbing" of the State Standard Specifications.

Clearing and Grubbing shall include the removal of existing shrubs, stumps, boulders, and trees, except trees specifically called out on plans to be protected or removed, in accordance with these Technical Specifications and as directed by the Engineer in the field. All shrubs, tree branches, tree trunk, and other landscaping debris shall be removed and disposed of outside of the Right-of-Way in accordance with relevant State Standard Specifications. The Contractor shall repair any private, landscaped areas damaged by construction activities at the Contractor's expense. The Contractor shall coordinate with each property owner adjacent to the project site and field confirm functionality of private irrigation systems with the property owner present to verify existing conditions prior to beginning construction activities.

It is the Contractor's responsibility to verify actual location of underground utilities prior to commencement of the work so as not to damage underground utilities.

The Contractor shall exercise caution when working around existing facilities. Any damage to existing trees, to private properties, to public utilities and/or other public facilities not identified on the plans for removal shall be repaired or replaced in kind at the Contractor's expense. The repair or replacement shall be to the satisfaction of the Engineer and no additional compensation will be allowed therefore.

Existing irrigation facilities within the limits of work shall remain in place unless noted otherwise on the plans. Irrigation facilities that are damaged by the Contractor's operation shall be reported immediately to the Engineer. The Contractor shall locate and mark all irrigation facilities. The Contractor shall be responsible for relocation and or repair of all irrigation lines and utilities that are in conflict with the proposed improvements in a way that ensures all previously irrigated area not encompassed by the proposed improvements will continue to receive irrigation. All irrigation repair and relocation shall be to the satisfaction of the Engineer and any affected property owners.

The Contractor shall remove and dispose of trash from the site work area and within Temporary Construction Easement of private property. Objectionable materials removed shall be disposed of outside the street right of way in accordance with the applicable sections of the State Standard Specifications and applicable laws. Any fees or costs associated with proper disposal of trash, debris, appliances, etc. is included in the price paid for the various items of work involved and not additional payment shall be allowed therefore.

Nothing herein shall be construed as relieving the Contractor of his responsibility for final cleanup of the project site, even if debris or trash existed prior to the Contractor beginning construction.

18-5.02 ROADWAY EXCAVATION

The work shall consist of excavation and removal of existing material as shown on the plans and as specified in Section 19, "Earthwork," of the State Standard Specifications. As per Occupational Safety & Health Administration (OSHA) standards, excavation over 5ft shall follow OSHA shoring and excavation safety procedures.

The Contractor shall remove existing asphalt concrete and soil as shown on the plans for the purposes of installing new roadway and bridge improvements. On the line at which the asphalt concrete is to be

removed, a straight, neat cut, with a power driven saw (or other acceptable means) shall be made to the full depth of the existing asphalt concrete prior to the removal of the asphalt concrete pavement.

Removal operations shall be performed with minimum damage to any portion of the asphalt concrete pavement that is to remain in place. All damage to the existing asphalt concrete to remain in place shall be repaired to a condition equal to that existing prior to the beginning of removal operations at the Contractor's own expense.

Residue from cutting operations shall not be permitted to flow into storm drains or across lanes occupied by traffic and shall be removed from the pavement surface, concurrent with the cutting operation. All excavated material shall be removed and disposed of outside the street right of way in accordance with relevant sections of the State Standard Specifications.

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the project site at the Contractor's own expense. No excavated material will be allowed to be stockpiled overnight in or adjacent to public right-of-ways, unless approved by the City. If stockpile locations are approved, all stockpiles shall be properly covered and barricaded.

Unless otherwise provided for in these Technical Specifications, the excavation may not be left without backfill during non-working hours except with prior written approval from the Engineer. Excavations left without backfill shall be barricaded and covered or otherwise protected to ensure public safety.

18-5.03 TREE PROTECTION AND/OR TRIMMING

The Contractor shall install orange temporary construction fencing at the drip line of trees (adjacent to the construction area), which are not identified on the plans for removal. Temporary fencing shall comply with "Temporary Fence (Type ESA)" as specified elsewhere in these Technical Specifications. The Contractor shall provide a submittal for City approval of the proposed fence and posts to be installed. Full compensation for completing the requirements of tree protection shall be considered as included in the prices paid for the various items of work involved and no additional payment will be allowed therefore.

The Contractor shall coordinate with the City Arborist, Brenden Mitchell, at (415) 485-3355, and the engineer for overhanging limbs and tree roots which may conflict with construction activities. The Contractor shall verify and obtain approval from the City Arborist prior to any trimming and/or disturbance of existing tree roots and branches of trees which are to remain.

It is the Contractor's responsibility to verify actual location of underground utilities prior to commencement of the work so as not to damage underground utilities.

All shrubs, tree branches, tree trunk, and other landscaping debris shall be removed and disposed of outside of the Right-of-Way in accordance with relevant State Standard Specifications.

18-5.04 TREE REMOVAL

The Contractor's attention is directed to the "Tree Protection" Section of these Technical Specifications.

Trees shall be removed as shown on the plans and as directed by the Engineer. Tree Removal shall conform to the provisions in Section 14-6 Biological Resources of the State Standard Specifications, and these Technical Specifications.

For the purposes of tree removal where necessary, the Contractor shall coordinate with PG&E for temporary deenergizing of overhead high voltage electrical lines. The Contractor will not be entitled to

damages or additional payment for delays, mobilization or demobilization caused by the utility company's failure to appear on site at the designated date and time for deenergizing utility lines. Any fees or payments required to deenergize electrical lines shall be paid for by the Contractor and included in the Mobilization bid item.

Where tree stumps are removed, the resulting depressions shall be cleaned of roots and loose materials and backfilled with compacted fill as required. Tree stumps and roots shall be removed to one foot below existing ground surface. In the event tree roots conflict with existing utilities and cannot be removed, the tree stump shall be ground to 6" below the subgrade.

If trees are to be removed during the bird nesting season (February 1 to August 31), a qualified, Contractor-supplied, biologist shall survey all suitable nesting habitat in the Biological Study Area (BSA) for presence of nesting birds. This survey shall occur no more than 10 days prior to the start of construction. If no nesting activity is observed, work may proceed as planned. If an active nest is discovered, a qualified biologist shall evaluate the potential for the proposed project to disturb nesting activities. The evaluation criteria shall include, but are not limited to, the location/orientation of the nest in the nest tree, the distance of the nest from the BSA, the line of sight between the nest and the BSA, and the feasibility of establishing nodisturbance buffers.

Additionally, the California Department of Fish and Wildlife shall be contacted to review the evaluation and determine if the project can proceed without adversely affecting nesting activities.

If work is allowed to proceed, a qualified, Contractor-supplied, biologist shall be on-site weekly during construction activities to monitor nesting activity. The biologist shall have the authority to stop work if it is determined the project is adversely affecting nesting activities.

The Contractor shall not be entitled to any right of way delay for delays caused by biological surveys and reviews by the California Department of Fish and Wildlife. Proper time extension to the contract will be allowed for any delays associated with nesting birds.

18-5.05 MISCELLANEOUS REMOVALS AND RELOCATIONS

The work shall consist of removing all necessary items in the field to construct the improvements as shown on the plans. This includes, but is not limited to, the following: concrete curbs, roadside signs and posts, fences, mail boxes, storm drain pipe, storm drain drop inlet, and any other item as directed by the Engineer.

Existing mailboxes shall be removed and relocate in conformance with the details shown on the plans and the provisions in Section 78-21, "Resetting and Relocating Mailboxes," of the State Standard Specifications. Existing posts, mounts, and hardware shall be disposed of in conformance with the provisions in Section 14-10, "Solid Waste Disposal and Recycling," of the State Standard Specifications.

During construction operations, the mailboxes shall be moved as necessary to clear the way for the Contractor's operations but shall be accessible for delivery at all times. During construction, the mailboxes shall be installed on posts set in the ground or the mailboxes may be installed on temporary supports approved by the Engineer.

When construction is complete, the mailboxes shall be installed in the final position as shown on the plans. Redwood posts shall conform to the provisions for sign posts in Section 56 2.02B, "Wood Posts," of the State Standard Specifications. The space around the posts shall be backfilled with earthy material. The backfill material shall be placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted.

18-5.06 MEASUREMENT AND PAYMENT

Clearing and Grubbing and Removals shall be measured on a lump sum (LS) basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in clearing and grubbing and removals, including removal of existing concrete curbs, fences, storm drain pipes, storm drain drop inlet, clearing vegetation, adjusting and relocating existing irrigation system elements, tree root removal, stump grinding, tree trimming and removals (up to 23" diameter), trimming shrubs, and all other material requiring removal for the construction of all improvements as shown on the plans, and proper disposal of materials all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Roadway Excavation shall be measured on a cubic yard (CY) basis and shall include full compensation for furnishing all the labor, material, tools, equipment, incidentals, and for doing all the work involved in roadway excavation for the construction of all improvements as shown on the plans (including sawcutting for all items requiring sawcutting), and proper disposal of materials all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Remove Tree and Stump (24" diameter and up) shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for removal of existing trees and grinding stumps, including hauling and disposal of materials, and all other miscellaneous incidental work, including coordination with private utility companies and surveys conducted by a certified, Contractor-supplied, biologist, if removals are to occur during the bird nesting season, as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

Reset Mailbox shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for removal, temporary relocation, and reinstallation of existing mail boxes, including coordination with property owners and the United States Postal Service, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

18-6 EARTHWORK

The work consists of performing earthwork activities in conformance with the provisions in Section 19, "Earthwork," of the State Standard Specifications and these Technical Specifications.

18-6.01 IMPORT BORROW

The work consists of obtaining imported borrow material for embankment construction in conformance with the provisions in section 19-7 "BORROW MATERIAL," of the State Standard Specification and these Technical Specifications.

18-6.02 MEASUREMENT AND PAYMENT

Import Borrow shall be measured on a cubic yard (CY) basis and shall include full compensation for furnishing all the labor, material, tools, equipment, incidentals, and for doing all the work involved in transporting, placing and compacting import borrow for the construction of all improvements as shown on the plans, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Structure Backfill shall be measured on a cubic yard (CY) basis and shall include full compensation for furnishing all the labor, material, tools, equipment, incidentals, and for doing all the work involved in transporting, placing and compacting backfill material for the construction of all improvements as shown on the plans, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

18-7 COLD PLANE AC PAVEMENT

18-7.01 GENERAL

The Contractor shall cold plane existing asphalt concrete pavement to the depth shown on the plans in accordance with Section 39-3.04, "Cold Planing Asphalt Concrete Pavement," of the State Standard Specifications and these Technical Specifications.

18-7.02 MEASUREMENT AND PAYMENT

Cold Plane AC Pavement (0.2' Depth) shall be measured and paid for on a square yard (SY) basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in cold planing asphalt concrete pavement as shown on the plans, including removing and disposing planed material and constructing temporary HMA tapers, as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

18-8 AGGREGATE BASE AND TREATED PERMEABLE BASE

18-8.01 GENERAL

Aggregate base shall be placed under all minor concrete, as specified below and as shown on the plans. Aggregate base shall be Class 2 and shall conform to the grading and quality requirements for ¾" maximum as specified in Section 26-1.02B, "Class 2 Aggregate Base," of the State Standard Specifications. Aggregate base material shall be compacted to 95% of maximum relative compaction as determined by standard test method ASTM D 6938 (replaces test D 2922); nuclear density device may be used.

The Contractor shall place permeable treated base to the depth shown on the plans in accordance with Section 29, "Treated Permeable Bases" of the State Standard Specifications and these Technical Specifications.

The Contractor shall coordinate with the City for material sampling and testing. The City's independent consultant shall have full access to all areas of the worksite necessary to sample and test required materials, including but not limited to aggregate base rock. Any material tested which does not meet the minimum design standards as outlined in the City's approved Quality Assurance Plan shall be removed and replaced at no cost to the City. The City will assume the cost of the testing.

The Contractor shall install aggregate base rock from **one** source to ensure compaction testing results are reliable and consistent for the duration of the project.

18-8.02 DAILY SUBMITTAL

The Contractor shall submit tickets indicating proof of tonnage of material delivered as the material arrives at the job site, or at anytime upon request of the Engineer. If the Contractor does not submit the tickets at the end of each day when aggregate base is installed, a temporary stop work order may be issued on the construction activity with no associated cost incurred by the City. The construction activity may resume with the Engineer's written approval upon receiving and reviewing all tickets.

18-8.03 MEASUREMENT AND PAYMENT

Class 2 Aggregate Base shall be measured on a cubic yard (CY) basis and shall include full compensation for furnishing all the labor, material, tools, equipment, incidentals, and for doing all the work involved for the construction of all improvements as shown on the plans and proper disposal of materials all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Cement Treated Permeable Base shall be measured on a cubic yard (CY) basis and shall include full compensation for furnishing all the labor, material, tools, equipment, incidentals, and for doing all the work involved for the construction of all improvements as shown on the plans and proper disposal of materials all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

18-9 HOT MIX ASPHALT

18-9.01 GENERAL

The Contractor shall install hot mix asphalt (HMA) to the depth shown on the plans and HMA Dike (Type F) in accordance with Section 39, "Asphalt Concrete," of the State Standard Specifications and these Technical Specifications.

18-9.02 MATERIALS

1. HMA shall be 1/2-inch Type A aggregate conforming to Section 39, "Asphalt Concrete," of the State Standard Specifications for the final lift (3" max. lift). The Contractor shall submit to the Engineer, at least ten (10) working days prior to the start of work, a list of sources of materials together with a Certificate of Compliance indicating that materials to be incorporated in the work fulfill the requirements of these specifications and a mix design for the HMA. The mix design shall be performed in accordance with Section 39-2.02 'Type A Hot Mix Asphalt,' of the State Standard Specifications. The Certificate of Compliance shall be signed by the material supplier or his representative. The Contractor shall be responsible for all costs associated with the required mix design.

2. Asphalt binder shall be steam refined paving asphalt conforming to Performance Grade (PG) System PG 64-16.

3. Asphaltic Emulsion for the application of the "Tack Coat" shall be paving asphalt Grade 120-150, Type SSI, as conforming to the provisions in Section 92, "Asphalt Binders," and Section 94, "Asphaltic Emulsions," of the State Standard Specifications.

18-9.03 CONSTRUCTION

HMA shall be produced and constructed in accordance with Section 39-2, "Hot Mix Asphalt," of the State Standard Specifications as modified by these Technical Specifications.

The surfaces upon which HMA is to be placed shall be thoroughly cleaned of all dirt, vegetation, and debris. Prior to application of tack coat, the street shall be cleaned with a vacuum street sweeper and be clean of all dust.

Existing paved surfaces shall be given a tack coat by spraying with penetration type emulsified asphalt (Type SSI) at the rate of 0.05 to 0.10 gallon per square yard as directed by the Engineer.

The HMA shall be placed and compacted in the excavation, after compaction of subgrade to 95% to the grade of existing road pavement. **The HMA shall be placed in 3-inch maximum lifts after compaction**. Conform sections shall be squared off and hand raked to a neat straight line. Edges at curb shall be hand raked and rolled with a small roller or tamper when larger roller cannot be used.

HMA shall be compacted to 95% of maximum relative compaction as determined by standard test method ASTM D 6938 (replaces test D 2922); nuclear density device may be used.

The completed surfacing shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities.

Any ridges, indentations or other objectionable marks left in the surface of the HMA shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the HMA shall be discontinued and other acceptable equipment shall be furnished by the Contractor.

The surface of the mixture after compression shall be smooth and true to the established crown and grade. Any mixture which becomes loose or broken, mixed with dirt, or in any way defective, shall be removed and replaced with fresh hot mixture and shall be immediately compacted to conform to the surrounding area.

18-9.04 TESTING AND CERTIFICATION

Prior to commencing work, the Contractor shall submit certification from the supplier that the material he is furnishing has been properly tested within the last 6 weeks and designed so as to meet the aforementioned specifications. Cost of any such testing shall be the responsibility of the Contractor and/or supplier.

During the work, the City may periodically sample and test the furnished material to ensure quality control in accordance with the City's Quality Assurance Program. The City will assume the cost of the testing; however, the Contractor will be required to pay for all failing tests.

Once a supplier's material has been found acceptable, the Contractor shall furnish material from no other source without the prior approval of the Engineer in writing.

18-9.05 DAILY SUBMITTAL

The Contractor shall submit asphalt concrete Weighmaster's Certificates as the material arrives at the job site, or at any time upon request of the Engineer. If the Contractor does not submit the Certificates at the end of each day when asphalt concrete is installed, a temporary stop work order may be issued on the paving operation with no associated cost incurred by the City. The paving operation may resume with the Engineer's written approval upon receiving and reviewing the Certificates.

18-9.06 MEASUREMENT AND PAYMENT

Measurement and payment for Hot Mix Asphalt (Type A), as determined by Weighmaster's Certificates, shall be per Ton and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in installation of HMA complete in place, including tack coat, cleaning surface, and all incidental work, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Place HMA Dike (Type F) shall be measured and paid for on a linear foot (LF) basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in installation of HMA Dike, including subgrade preparation, complete in place, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Section 9-1.07C, "Payment Adjustments," of the State Standard Specifications shall not apply. No adjustments in payment will be made for fluctuations in the cost of asphaltic materials.

18-10 MINOR CONCRETE

18-10.01 GENERAL

Concrete curbs, pathways and pads shall be constructed in accordance with Section 73, "Concrete Curbs and Sidewalks," of the State Standard Specifications and the details shown on the plans. Concrete used to construct curbs, pathways and irrigation tank pads shall be minor concrete in accordance with Section 90-2, "Minor Concrete," of the State Standard Specifications. Aggregate shall comply with Section 90-1.02C, "Aggregates," of the State Standard Specifications. All concrete shall include two pounds per cubic yard of BASF Jet black PS1414 coloring admixture, or approved equal.

The Contractor shall coordinate with the City for material sampling and testing. The City's independent consultant shall have full access to all areas of the worksite necessary to sample and test required materials, including but not limited to minor concrete. Any material tested which does not meet the minimum design standards as outlined in the City's approved Quality Assurance Plan shall be removed and replaced at no cost to the City. The City will assume the cost of the testing.

Type F concrete curb shall conform to the Marin County Uniform Construction Standards Drawing Nos. 100 and 105.

4" thick PCC pathway shall conform to the details provided on the construction plans.

6" thick PCC irrigation tank pad shall conform to the details provided on the construction plans.

Exposed corners shall be rounded with a steel tool with a ½ inch radius. Finish of new concrete pathway shall match finish of existing pathways to which they are connected.

Subgrade shall be compacted to 95% of maximum relative compaction as determined by standard test method ASTM D 6938 (replaces test D 2922); nuclear density device may be used. All soft or spongy subgrade material within pathway areas shall be removed and replaced with suitable material as required by the Engineer.

Where new concrete is joining existing concrete, the new concrete shall align and conform to adjacent elevations. New pathways shall be attached to existing pathways by means of steel dowels in accordance with the details shown on the plans. Steel dowels shall be Grade 40 No. 3 rebar.

The Engineer shall be notified 24 hours prior to concrete pour. The Contractor shall provide string lines and forms delineating the proposed concrete surface for the Engineer's observation a minimum of 4 (four) hours prior to concrete pour. **No concrete shall be poured until the Engineer has approved the forms.**

All oil, paint, tire, graffiti and other marks shall be removed from all minor concrete construction by sandblasting or complete replacement prior to acceptance by the Engineer. Cement mortar will not be an acceptable substitute for sandblasting or complete replacement.

All grade differentials adjacent to new concrete over 1" shall be backfilled with native soil at a 4:1 maximum slope and compacted to 90% relative compaction. No separate payment will be made for backfilling and compaction of native soil.

18-10.02 DAILY SUBMITTAL

The Contractor shall provide delivery tickets at the time of delivery of each load of concrete. Each delivery ticket shall state the total yield in cubic yards, date, and time of day corresponding to when the batch was loaded, when it was dispatched, when it arrived at the job, and the time that unloading began.

18-10.03 MEASUREMENT AND PAYMENT

Minor Concrete curbs, pathway and pad shall be measured and paid for on a lump sum basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in installation of concrete curb, pathway and irrigation tank pad, including subgrade preparation, complete in place, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

18-11 STORM DRAIN IMPROVEMENTS

18-11.01 GENERAL

Storm drain improvements, including but not limited to catch basins, drop inlet and turning structures, and storm drain pipe, shall be constructed in accordance with the provisions of the Uniform Constriction Standards of the Cities and County of Marin, State Standard Specifications, and these Technical Specifications.

18-11.02 DROP INLET AND TURNING STRUCTURE

Marin County drop inlet and turning structures shall be installed at the locations shown on the plans. Catch basins shall consist of a 6-sack mix and use grade 60 reinforcing steel bars. In areas of over-excavation, install class 2 aggregate base rock.

The Contractor shall pour in place all drop inlets and turning structures; no pre-cast drop inlets and turning structures will be allowed.

18-11.03 STORM DRAIN PIPE

The work consists of furnishing and installing HDPE storm drain pipe conforming to the provisions of Section 64, "Plastic Pipe," of the State Standard Specifications and these Technical Specifications.

Storm drain pipe shall be of the types and sizes shown on the plans, and be High Density Polyethylene (HDPE), Type S pipe with flexible rubber rings for elastomeric gasket joints providing a watertight seal at the locations shown on the plans. All rubber rings shall conform to ASTM F 477. All joints shall be integral wall bell and spigot configuration, factory formed. Pipes at joints are not to be inserted beyond "stop mark" on spigot end.

All pipes and fittings shall be laid accurately to the lines and grades as shown on the plans and as provided by the Engineer. Joints shall be properly made up with pipes properly inserted into hubs and gaskets shall be fully seated. Special care shall be taken that there is no sagging of the spigot end in the hub and that a true surface is given to the invert throughout the entire length of the reach being laid.

The pipe shall be centered in the trench.

Unless otherwise specifically permitted by the Engineer, all pipe must be laid upgrade.

Where ground water or surface drainage occurs, pumping must continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe.

A uniform surface shall be provided in the trench with full bearing under the entire length of the pipe.

When it is necessary to cut HDPE pipe for placement of fittings, damaged pipe, etc., it is essential that a square cut be made to ensure proper assembly. The cut ends shall be beveled to manufacturer's specifications. The interior of all pipes shall be kept free from dirt, mortar, and other foreign materials as the pipe laying progresses and left in a clean condition at the completion of the work.

The Contractor shall install bedding and backfill per the trench section detail in Appendix B, when applicable. The Contractor may assume that CDF as appropriate backfill is acceptable when in a roadway otherwise the Contractor shall install class 2 aggregate base rock as backfill. The cost of hot mix asphalt shown in the trench section detail is included in this bid item when applicable.

The Contractor shall excavate, remove, and dispose of any and all material encountered to install the pipe and break into existing structures as required and grout watertight. The Contractor is responsible for the removal and replacement of any facilities required to perform the work.

Contractor shall include trench shoring per Cal OSHA requirements, as necessary, and also to support the sides of the excavation and surrounding street structural section. The Contractor shall make Technical Specifications to deal with existing storm waterflow and any adjacent utility trench that may exists near the trench. The Contractor shall provide all the necessary support/bracing to protect any existing nearby utilities and other special precautions that may be required from the utility companies and the City. All of this work shall be performed to the satisfaction of the Engineer and the respective utility companies.

18-11.04 MEASUREMENT AND PAYMENT

Drop Inlet and Turning Structures shall be paid for at the contract unit price (EA) and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for installing the drop inlet and turning structures (with galvanized steel lid or grate where shown on the plans), complete in place, including backfill (if needed), dewatering (if needed), steel reinforcement, excavation, removal of excavated material and off-site disposal, connection to storm drain pipes, grouting around pipes, protection of utilities, shoring per OSHA requirements (if needed), dealing with existing flows, and other miscellaneous work in accordance with relevant sections of the State Standard Specifications and these Technical Specifications, and no additional payment will be allowed therefore.

12-inch Storm Drain Pipe (Type S HDPE) shall be by the linear foot (LF), based on field measurements along the centerline of the pipe installed and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals to furnish and install the pipe, complete in place, including structure excavation and structure backfill, shoring, dewatering (if needed), bedding, backfill, grout, connecting new pipe to existing or new facilities (i.e. catch basins and turning structures), and other miscellaneous work in accordance with relevant sections of the State Standard Specifications and these Technical Specifications, and no additional payment will be allowed therefore.

18-12 STEEL BACKED TIMBER BARRIER

18-12.01 GENERAL

Steel backed timber barrier shall conform to the details shown on the plans, including posts, steel post sleeves and foundation.

18-12.02 MEASUREMENT AND PAYMENT

Steel Backed Timber Barrier and Steel Backed Timber Barrier (Modified Steel Post) shall be measured and paid for on a per linear foot (LF) basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in furnishing and installing new steel backed timber barriers and posts, including excavation, removal of spoils, concrete, retroreflective tape, steel backing, and installation in retaining walls, complete in place, all as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

Steel Backed Timber Barrier (Modified Steel Post Sleeve) (shall be measured and paid for on a per each (EA) basis and shall include full compensation for furnishing all the labor, materials, tools, equipment, incidentals, and for doing all the work involved in furnishing and installing new steel backed timber barriers post sleeves, including excavation, removal of spoils, concrete, and installation in retaining walls, complete in place, all as specified in the Plan Details, these Technical Specifications, and as directed by the Engineer, and no additional compensation will be allowed therefore.

18-13 ROADSIDE SIGNS

18-13.01 GENERAL

The work consists of installing, removing, salvaging, and disposing roadway signs and posts in accordance Section 56-4, "Roadside Signs," of the State Standard Specifications, these Technical Specifications, and the construction plans.

18-13.02 ROADSIDE SIGN REMOVAL

Removed sign panels shall be disposed of or salvaged to the City as directed by the Engineer. Removed sign posts and foundations shall be disposed of outside the street right of way in accordance with the applicable sections of the State Standard Specifications and applicable laws. The costs to remove sign posts and foundations is included elsewhere in these Technical Specifications.

18-13.03 ROADSIDE SIGN INSTALLATION

Roadside signs and posts, Roadside signs and posts (Timber Barrier attached), object makers, and mounting shall be installed at the locations shown on the plans, or where directed by the Engineer and shall conform to the provisions in Section 82-3, "Roadside Signs," of the State Standard Specifications and these Technical Specifications. Signs shall be relocated to new metal posts with sleeves per City of San Rafael Standard Details as shown in the Appendices.

18-13.04 OBJECT MARKERS AND DELINEATORS

Markers and delineators shall conform to the provisions in Section 82, "Signs and Markers," of the State Standard Specifications and these Technical Specifications.

18-13.05 MEASUREMENT AND PAYMENT

Remove Roadside Sign and Post shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for removal of roadside signs, posts and foundations, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

Install Roadside Sign and Post (Metal Post) shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for installation of new roadside signs and posts with new foundations, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

Install Roadside Sign and Post (Modified Timber Barrier Attached) shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for installation of new roadside signs timber barrier modified post, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

Install Object Marker (Type P) shall be paid for on a per unit (EA) basis. The contract unit price paid shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary for installation of new object markers and posts with new foundations, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

18-14 TRAFFIC STRIPES AND PAVEMENT MARKINGS

18-14.01 GENERAL

The work consists of installation traffic stripes and pavement markings in conformance with the provisions in Section 84, "Markings," of the 2018 State Standard Specifications and these Technical Specifications. Traffic stripes and pavement markings shall be removed at the locations shown on the plans and as directed by the Engineer. All conflicting striping and pavement markings shall be removed, if not removed during asphalt grinding operations.

18-14.02 THERMOPLASTIC STRIPING AND PAVEMENT MARKINGS

Thermoplastic material shall be free of lead and chromium, and shall conform to the requirements in State Specification PTH-02ALKYD.

Retroreflectivity of the thermoplastic traffic stripes and pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 250 $mcd \cdot m^{-2} \cdot lx^{-1}$. Yellow thermoplastic traffic stripes and pavement markings shall have a minimum initial retroreflectivity of 150 $mcd \cdot m^{-2} \cdot lx^{-1}$.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern. The minimum application rate is based on a solid stripe of 100 mm in width. Thermoplastic traffic stripes shall be applied at the minimum thickness and application rate as specified below. The minimum application rate is based on a solid stripe of 100 mm in width.

Minimum Stripe Thickness (mm)	Minimum Application Rate (kg/m)
2.0	0.4
2.5	0.5

Thermoplastic traffic stripes and pavement markings shall be installed in accordance with Section 84-1.03, "Construction," of the State Standard Specifications. Thermoplastic traffic stripes and pavement markings shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

18-14.03 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 81-3, "Pavement Markers," of the State Standard Specifications and these Technical Specifications.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 81-3.02C, "Retroreflective Pavement Markers," of the State Standard Specifications.

The Contractor shall place blue reflective pavement markers in the center of the travel lane nearest each fire hydrant.

Thermoplastic roadway markings such as lane markings, arrows, crosswalks, parking stalls, etc., shall be in accordance with Section 84-1.03E, "Application of Stripes and Markings," of the State Standard Specifications.

18-14.04 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the State Standard Specifications and these Technical Specifications. Nothing in these Technical Specifications shall be construed as reducing the minimum standards specified in the California MUTCD or as relieving the Contractor from the responsibilities specified in Section 7-1.04, "Public Safety," of the State Standard Specifications.

GENERAL

When the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place before opening the traveled way to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or markers. Surfaces to receive application of paint or removable traffic tape temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation, or as determined by the Engineer.

Temporary pavement markers, including underlying adhesive, that are applied to the final layer of surfacing or existing pavement to remain in place or that conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

TEMPORARY TRAFFIC STRIPE (PAINT)

The painted temporary traffic stripe shall be complete in place at the location shown before opening the traveled way to public traffic. Removal of painted temporary traffic stripe will not be required.

Temporary painted traffic stripe shall conform to the provisions in "Paint Traffic Stripe and Pavement Marking" of these Technical Specifications, Section 84-3, "Painted Traffic Stripes and Pavement Markings," of the State Standard Specifications, except for payment. At the option of the Contractor, either one or two coats shall be applied regardless of whether on new or existing pavement.

TEMPORARY PAVEMENT MARKING (PAINT)

Temporary pavement marking consisting of painted pavement marking shall be applied and maintained at the locations shown on the plans. The painted temporary pavement marking shall be complete in place at the location shown before opening the traveled way to public traffic. Removal of painted temporary pavement marking will not be required.

Temporary painted pavement marking shall conform to the provisions in "Paint Traffic Stripe and Pavement Marking" of these Technical Specifications, except for payment. At the option of the Contractor, either one or two coats shall be applied regardless whether on new or existing pavement.

TEMPORARY PAVEMENT MARKERS

Temporary pavement markers shall be applied complete in place before opening the traveled way to public traffic.

Temporary pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used in areas where removal of the pavement markers will be required.

Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these Technical Specifications may be used in place of temporary pavement markers for long term day/night use (180 days or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these Technical Specifications except the waiting period provisions before placing the pavement markers on new hot mix asphalt surfacing as specified in Section 85-1.06, "Placement," of the State Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

18-14.05 MEASUREMENT AND PAYMENT

The contract lump sum (LS) price paid for Thermoplastic Traffic Stripes and Pavement Markings, of the various types indicted, shall include furnishing all labor, materials and equipment to remove and dispose of existing traffic stripes and install new permanent and temporary traffic stripes, pavement markings, and markers, as shown on the plans, and all other miscellaneous incidental work involved as directed by the Engineer and as specified by these Technical Specifications, and no additional payments will be allowed therefore.

Installation of blue reflective markers at fire hydrants shall be included in the prices paid for various items of work involved and no additional payments will be allowed therefore.

ORGANIZATION

Technical Specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*.

Each technical specification begins with a revision clause that describes or introduces a revision to the *Standard Specifications* as revised by any revised standard specification.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

18-15 EARTHWORK

The work consists of performing earthwork activities in conformance with the provisions in Section 19, "Earthwork," of the State Standard Specifications and these Technical Specifications.

Replace "Reserved" section 19-11 of the State Standard Specifications with:
19-11 CELLULAR CONCRETE LIGHTWEIGHT EMBANKMENT MATERIAL

19-11.01 GENERAL

19-11.01A Summary

Section 19–11 includes specifications for placing cellular concrete lightweight embankment material to the lines, grades and dimensions shown.

Lightweight cellular concrete backfill includes constructing geocomposite drain systems. The systems must comply with section 68-7.

Cellular concrete is designated on the plans as Class I through Class VI as shown in the following table:

Cellular Concrete Class	Cast Density Pcf	Minimum Compressive Strength at 28 days* psi
I	24-29	10
II	25-30	40
III	36-41	80
IV	42-49	120
V	50-79	160
VI	80-90	300

*Compressive Strength determined using ASTM C 495 as modified herein

19-11.01B Submittal

19-11.01B(1) Mix Design

You must provide a manufacturer's product certificate showing evidence of Third Party Quality Control. Submit a mix design that will produce a cast density at point of placement and a minimum compressive strength for the class described. Include laboratory data using the mix design verifying cast density and strength requirements.

Field qualification test reports must be certified with a signature by an official in responsible charge of the laboratory performing the tests.

19-11.01B(2) Quality Control and Placement Plan

You must provide a manufacturer's product certificate showing evidence of Third Party Quality Control. Submit a mix design that will produce a cast density at point of placement and a minimum compressive strength for the class described. Include laboratory data using the mix design verifying cast density and strength requirements.

Submit a cellular concrete quality control and placement plan 10 working days before placement of embankment material. Placement of cellular concrete must be in accordance with the information provided in the quality control plan.

The quality control and placement plan must include:

1. An organization chart including names, telephone numbers, current certifications and/or titles, and roles and responsibilities of all those involved in the quality control program.
2. The process of communication by which quality control information will be disseminated to the appropriate persons, including materials suppliers.
3. Written evidence that cellular concrete installer is certified by and approved by the foam agent manufacturer
4. Location of equipment and batching areas.
5. Proposed construction sequence and schedule.
6. Type of equipment and tools to be used.
7. Material list of items and manufacturer's specifications
8. A copy of the AASHTO accreditation for your laboratory conducting the testing for compressive strength testing of cellular concrete cylinders.

19-11.02 MATERIALS

19-11.02A General

All materials must be delivered, stored and handled per recommendations of cellular concrete manufacturer.

19-11.02B Admixtures

Admixtures for accelerating the set time may be used under the manufacturer's recommendations. A foaming agent must be used and tested in accordance with ASTM C 796.

19-11.02C Water

Mixing water must comply with section 90-1.02D.

19-11.02D Portland Cement

Portland cement must comply with ASTM C 150, Types II/ V. Pozzolans and other cementitious materials may be used when approved by the manufacturer of the foaming agent. Fly ash and natural pozzolans must comply with ASTM C 618. Ground granulated blast furnace slag must comply with ASTM C 989, grade 100 or 120.

19-11.03 CONSTRUCTION

19-11.03A Specialized Batching, Mixing, and Placing Equipment

Batching, mixing and placing equipment must be capable of producing material that meets the requirements of this section. Cement and water may be premixed and delivered to the site. Foam must be added and mixed at the site using aforementioned equipment.

19-11.03B Personnel Requirements

The cellular concrete installer must be certified and approved in writing by the foam agent manufacturer. The installer's foreman must have a minimum of 2 years experience in this work and must have worked on at least 3 successful cellular concrete projects.

The installer must use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the work.

The Contractor's Representative must be experienced in the placement of cellular concrete and must be on site full-time during placement.

19-11.03C Quality Control and Quality Assurance Testing

19-11.03C(1) Cast Density

During placement of the initial batch, the installer must check the density and adjust the mix as required to obtain the manufacturer's specified cast density at point of placement.

At the point of placement, the density must comply with the specified cast density. A single cast density test must represent the lesser of 100 cy or 2 hours production.

19-11.03C(2) Compressive Strength

The compressive strength must be tested under ASTM C 495 except as follows:

1. Furnish a sufficient quantity of molded and cured cylinders specimens. Unless otherwise approved, the specimens must be 3 x 6 inch cylinders. During molding, place the concrete in 2 equal layers and raise and drop the cylinders 1 inch, 3 times on a hard surface or lightly tap the side or bottom of the cylinder to close any accidental entrained air. No rodding is allowed.
2. At a minimum, prepare a set of 4 test cylinders for each 400 CY of cellular concrete placed or a minimum of 2 sets of 4 cylinders each per day (whichever is greater). Specimens must be covered and protected immediately after casting to prevent damage and loss of moisture. Specimens must be cured in the molds for up to 7 days and then removed from the mold and moist cured. Stop moist curing specimens from 24 to 72 hours before the 28 day compressive strength test and allow to air dry. Specimens must not be oven dried.

19-11.03C(3) Acceptance Testing

At a minimum, provide 3 test cylinders for each 400 CY of cellular concrete placed or a minimum of 2 sets of 4 cylinders each per day (whichever is greater) to Engineer. Specimens must be covered and protected immediately after casting to prevent damage and loss of moisture.

19-11.03D Site Preparation

Subgrade to receive embankment material must be free of all loose and extraneous material. Subgrade must be uniformly moist, and any excess water standing on the surface must be removed before placing embankment material.

19-11.03E Placement

Cellular concrete must be a homogeneous mixture and all materials must be approved prior to use.

Cellular concrete must be job site mixed with foaming agent and placed with equipment specialized for cellular concrete lightweight material. Cement and water may be premixed and delivered to the job site and foaming agent added on site. Once mixed, the cellular concrete must be conveyed promptly to the location of placement without excessive handling.

Cellular concrete lift thicknesses must not exceed 3 feet. After curing for 12 hours, any crumbling area on the surface must be removed and scarified before the next layer is placed. Surface stepping to achieve grade and super elevation under the pavement must not be less than 5 inches nor more than 6 inches in thickness.

A minimum 12 hour curing period between lifts is required. If ambient temperatures are anticipated to be below 32 degrees F within 8 hours after cellular concrete placement, mixing water must either be heated as approved by foaming agent manufacturer or placement must be prohibited. Cellular concrete must not be placed on frozen ground. Cellular concrete must not be placed in wet ground condition. Dewatering is necessary where groundwater is present.

Any material that does not meet the minimum specified strength within 28 days must be removed and replaced by the Contractor at no additional cost.

Paving machines, heavy construction equipment are not permitted on cellular concrete until it has attained the specified 28-day compressive strength.

19-11.03F Acceptance

You must rectify any cellular concrete material rejected by the Engineer that does not meet the minimum required material properties or is not installed in accordance with this specification. Corrective measures are subject to the approval of the Engineer. You will perform accepted corrected measures at no additional cost to the State or extension of the contract time. This includes removal and replacement of rejected cellular concrete material not meeting the minimum material requirements or installed in accordance with this specification.

19-11.04 Payment

The payment quantity for cellular concrete lightweight embankment material is determined based on the dimensions shown on the plans.

18-16 PILING

The work consists of constructing piles in conformance with the provisions in Section 49, "Piling," of the State Standard Specifications and these Technical Specifications.

Add to section 49-1.03 of the State Standard Specifications:

Expect difficult pile installation due to the conditions shown in the following table:

Pile location		Conditions
Bridge no.	Support location	
27C0167	All	Presence of weathered sedimentary rock that could result in hard drilling requiring diamond coring. Rock Quality Designation up to 90% and rock core unconfined compressive strength ranges from 135 to 363 tsf.
27C0167	All	Potential for caving soils

Add to section 49-3.02B(6)(c) of the State Standard Specifications:

The synthetic slurry must be one of the materials shown in the following table:

Material	Manufacturer
SlurryPro CDP	KB INTERNATIONAL LLC 735 BOARD ST STE 209 CHATTANOOGA TN 37402 (423) 266-6964
Super Mud	PDS CO INC 105 W SHARP ST EL DORADO AR 71731 (870) 863-5707
Shore Pac GCV	CETCO CONSTRUCTION DRILLING PRODUCTS 2870 FORBS AVE HOFFMAN ESTATES IL 60192 (800) 527-9948
Terragel or Novagel Polymer	GEO-TECH SERVICES LLC 220 N. ZAPATA HWY STE 11A-449A LAREDO TX 78043 (210) 259-6386
BIG FOOT	MATRIX CONSTRUCTION PRODUCTS 50 S MAIN ST STE 200 NAPERVILLE IL 60540 (877) 591-3137
POLY-BORE	BAROID INDUSTRIAL DRILLING PRODUCTS 3000 N SAM HOUSTON PKWY EAST HOUSTON TX 77032 (877) 379-7412

Use synthetic slurries in compliance with the manufacturer's instructions. Synthetic slurries shown in the above table may not be appropriate for a given job site.

Synthetic slurries must comply with the Department's requirements for synthetic slurries to be included in the above table. The requirements are available from the Offices of Structure Design, P.O. Box 168041, MS# 9-4/11G, Sacramento, CA 95816-8041.

SlurryPro CDP synthetic slurry must comply with the requirements shown in the following table:

SlurryPro CDP

Quality characteristic	Test method	Requirement
Density During drilling (pcf) Before final cleaning and immediately before placing concrete (pcf)	Mud weight (density), API RP 13B-1, section 4	 ≤ 67.0[a] ≤ 64.0[a]
Viscosity During drilling (sec/qt) Before final cleaning and immediately before placing concrete (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	 50–120 ≤ 70
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	 ≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Super Mud synthetic slurry must comply with the requirements shown in the following table:

Super Mud

Quality characteristic	Test method	Requirement
Density During drilling (pcf) Before final cleaning and immediately before placing concrete (pcf)	Mud weight (density), API RP 13B-1, section 4	 ≤ 64.0[a] ≤ 64.0[a]
Viscosity During drilling (sec/qt) Before final cleaning and immediately before placing concrete (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	 32–60 ≤ 60
pH	Glass electrode pH meter or pH paper	8.0–10.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	 ≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Shore Pac GCV synthetic slurry must comply with the requirements shown in the following table:

Shore Pac GCV

Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	≤ 64.0[a]
Before final cleaning and immediately before placing concrete (pcf)		≤ 64.0[a]
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	33–74
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 57
pH	Glass electrode pH meter or pH paper	8.0–11.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Terragel or Novagel Polymer synthetic slurry must comply with the requirements shown in the following table:

Terragel or Novagel Polymer

Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	≤ 67.0[a]
Before final cleaning and immediately before placing concrete (pcf)		≤ 64.0[a]
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	45–104
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 104
pH	Glass electrode pH meter or pH paper	6.0–11.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

BIG-FOOT synthetic slurry must comply with the requirements shown in the following table:

BIG-FOOT

Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	≤ 64.0[a]
Before final cleaning and immediately before placing concrete (pcf)		≤ 64.0[a]
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	30–125
Before final cleaning and immediately before placing concrete (sec/qt)		55-114
pH	Glass electrode pH meter or pH paper	8.5–10.5
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

POLY-BORE synthetic slurry must comply with the requirements shown in the following table:

POLY-BORE

Quality characteristic	Test method	Requirement
Density During drilling (pcf)	Mud weight (density), API RP 13B-1, section 4	62.8-65.8[a]
Before final cleaning and immediately before placing concrete (pcf)		62.8-64.0[a]
Viscosity During drilling (sec/qt)	Marsh funnel and cup. API RP 13B-1, section 6.2	50–80
Before final cleaning and immediately before placing concrete (sec/qt)		50-80
pH	Glass electrode pH meter or pH paper	7.0–10.0
Sand content, percent by volume Before final cleaning and immediately before placing concrete (%)	Sand, API RP 13B-1, section 9	≤ 1.0

NOTE: Slurry temperature must be at least 40 °F when tested.
[a]If authorized, you may use slurry in a salt water environment. The allowable density of slurry in a salt water environment may be increased by 2 pcf.

Add to section 49-3.02C(2) of the State Standard Specifications:

Do not allow drilled holes to stand open overnight.

18-17 CONCRETE STRUCTURES

The work consists of constructing concrete structures in conformance with the provisions in Section 51, "Concrete Structures," of the State Standard Specifications and these Technical Specifications.

Add to section 51-1.01C(1) of the State Standard Specifications:

If the methacrylate crack treatment is performed within 100 feet of a residence, business, or public space, submit a public safety plan that includes:

1. Public notification letter with a list of delivery and posting addresses. The letter must describe the work to be performed and state the treatment work locations, dates, and times. Deliver the letter to residences and businesses within 100 feet of overlay work and to local fire and police officials not less than 7 days before starting overlay activities. Post the letter at the job site.
2. Airborne emissions monitoring plan. A CIH certified in comprehensive practice by the American Board of Industrial Hygiene must prepare and execute the plan. The plan must have at least 4 monitoring points including the mixing point, application point, and point of nearest public contact. Monitor airborne emissions during overlay activities.
3. Action plan for protecting the public if levels of airborne emissions exceed permissible levels.
4. Copy of the CIH's certification.

After completing methacrylate crack treatment activities, submit results from monitoring production airborne emissions as an informational submittal.

Replace the 2nd paragraph of section 51-1.01C(1) of the State Standard Specifications with:

Submit a deck placement plan for concrete bridge decks. Include in the placement plan your method and equipment for ensuring that the concrete bridge deck is kept damp by misting immediately after finishing the concrete surface.

Replace the 1st paragraph of section 51-1.03F(5)(b)(i) of the State Standard Specifications with:

Except for bridge widenings, texture the bridge deck surfaces longitudinally by grinding and grooving.

18-18 STRUCTURAL STEEL COATINGS

The work consists of coating structural steel in conformance with the provisions in Section 59, "Structural Steel Coatings," of the State Standard Specifications and these Technical Specifications.

Add to section 59-3.03 of the State Standard Specifications:

For the California ST-70 side mounted bridge rail, the 2nd finish coat must match color no. 27925 of AMS-STD-595.

18-19 EXISTING STRUCTURES

The work consists of performing work on existing structures in conformance with the provisions in Section 60, "Existing Structures," of the State Standard Specifications and these Technical Specifications.

Add to section 60-2.01A of the State Standard Specifications:

Remove the following structures or portions of structures:

Bridge no./Structure name	Description of work
27C0148 / Southern Heights Blvd Bridge	Removal of existing 29-span timber stringer bridge approximately 162 feet long and 10 feet wide, including a portion of adjacent retaining walls and removal of concrete footings.

18-20 MISCELLANEOUS METAL

The work consists of fabricating and installing miscellaneous metal in conformance with the provisions in Section 75, "Miscellaneous Metal," of the State Standard Specifications and these Technical Specifications.

Add to the list in the 2nd paragraph of section 75-3.01A:

6. Waterline support brackets

18-21 INCIDENTAL CONSTRUCTION

The work consists of constructing incidental bid items in conformance with the provisions in Section 78, "Incidental Construction," of the State Standard Specifications and these Technical Specifications.

Replace *Not Used* in section 78-4.02B of the State Standard Specifications with:

The painted timber must match color no. 27925 of AMS-STD-595.

Replace the *Reserved* in the RSS for section 78-4.03A(4) of the State Standard Specifications with:

Construct a test panel for the painted concrete surfaces in conformance with section 51-1.01D(2)(c).

The test panel must be:
1. Painted using the same personnel, materials, equipment and methods to be used in the work
2. Accessible for viewing
3. Displayed in an upright position near the work
4. Authorized for painting before starting the painting work

If ordered, prepare and paint additional test panels until a satisfactory color is attained. The preparing and painting of more than 2 additional test panels is change order work.

The Engineer uses the authorized painted test panel to determine acceptability of the painted surface.

Dispose of test panels after the painting work is complete and authorized. Notify the Engineer before disposing of the test panes.

Replace the 2nd paragraph of the RSS for section 78-4.03B of the State Standard Specifications with:

The painted concrete must match color no. 27925 of AMS-STD-595.

18-22 RAILINGS AND BARRIERS

The work consists of constructing railings and barriers in conformance with the provisions in Section 83, "Railings and Barriers," of the State Standard Specifications and these Technical Specifications.

Add to section 83-2.05A(1) of the State Standard Specifications:

California ST-70 side mounted bridge rail work includes the timber railings.

Preparing and painting the timber railings and concrete end blocks must comply with section 78-4.

Replace 7 in the 2nd paragraph of section 83-2.05A(3) of the State Standard Specifications with:

9

Add to section 83-2.05B(4) of the State Standard Specifications:

Prepare and paint the exposed galvanized surfaces of the California bridge rail under section 59-3.

Do not chemically treat the galvanized surfaces before cleaning and painting. Galvanize the nuts, bolts, and washers after fabrication.

Add to section 83-2.05B of the State Standard Specifications:

83-2.05B(5) TIMBER

Timber railings must comply with section 57-2.

18-23 WATER LINE REPLACEMENT

The work consists of constructing water line systems in conformance with the provisions in Section 77, "Local Infrastructure," of the State Standard Specifications and these Technical Specifications.

Replace Reserved in section 77-1 with:

77-1 WATERLINE SYSTEM

77-1.01 GENERAL

77-1.01A Summary

Section 77-1 includes specifications for removing existing waterline and constructing new waterline system as specified in the Marin Municipal Water District (District) Construction Standards (See Appendix E of these Technical Specificatons), American Water Works Association (AWWA) and these Special Provisions.

The work includes:

1. Remove existing waterline
2. Install 6" Welded Steel Pipe

77-1.01B Site Conditions

Connect the new water system to the existing pipelines as shown on the Districts plans. Connections of the new pipeline to the existing pipeline must be completed within 8 hours of system shutdown unless otherwise approved by the Engineer and the District and per Section 02713 – Distribution System Piping. All equipment, materials, tools and labor necessary to complete the connections shall be on-site before the shutdowns. Conditions shall be verified with the District and the Engineer. The District will coordinate shutdown notifications with the residents at least 48 hours prior to any mainline shutdown.

77-1.01C Submittals

77-1.01C(1) General

Submit a work plan describing equipment, labor, and material required to accomplish the work within the permitted time frame.

At least 20 days before the start of work, submit a complete list of materials with manufacturer and model number.

Unless otherwise noted on the Plans or Specifications, all water mainline system piping, fittings and appurtenances shall be provided by the District.

The Contractor shall furnish and install the 6-inch flange by flange EBAA-Iron Force Balanced Flex Tend Joint or approved equal as specified on the project plans or these specifications.

The Contractor shall furnish and install the 2-inch APCO Air Relieve Vacuum valve or approved equal as specified on the project plans or these specifications.

77-1.01C(2) Shop Drawings

Submit shop drawings, catalogs, and engineering data for the Contractor furnished materials. Submit the manufacturer's certified working drawings covering the design, manufacture and fabrication of fittings, special fittings, joint details, restraint systems and lengths, and other information for the water system and accessories that show the items conform to the requirements herein.

Show pipeline stations on centerline of pipe. Include in the working drawings detailed engineering layout sheets showing by pipe marking number the order in which the various pieces of the pipe are to be

assembled during construction and such other information as may be required by the Engineer to determine compliance with these special provisions.

77-1.01C(5) Notifications
Contractor shall notify the District and the Engineer at least 15 working days before the intended shutdowns. Keep the duration of shutdowns to a minimum and in no case must the shutdowns be more than 8 hours each. While the existing pipeline is shut down the connection work must be performed without interruption. The signed authorization is required before each shutdown.

Notify the Engineer of any conflicts at least 10 working days before installation of the water main.

The District shall operate all valves. Provide notice to the District at least 5 working days for required valve operations.

Test and disinfect the new waterline before the connection to the existing facilities is made per Section 02713 – Distribution System Piping.

Contractor shall notify the Engineer at least 72 hours before each of the dates proposed to make connections to existing facilities.

77-1.01D Quality Control and Assurance
77-1.01D(1) Chlorination and Flushing of Pipes
Disinfection/Chlorination and Flushing of Pipes must comply with Section 02713 – Distribution System Piping of the District Specifications. Chlorinated water shall become property of the Contractor.

77-1.01D(2) Hydrostatic Testing of Pipes
Hydrostatic Testing of Pipes must comply with the requirements in Section 02713 – Distribution System Piping of the District Specifications.

77-1.02 MATERIALS
77-1.02A General
All equipment and material must be new, of the most recent model, and free from defects. Previously owned, previously installed, "like new," unused, surplus, rebuilt, repossessed, or reconditioned material or equipment shall not be acceptable. All equipment must be the product of reputable suppliers having adequate experience in the manufacture of these particular items.

77-1.02B Material Availability
The District will furnish the following products for installation:

1. Section 02713 - Distribution System Piping
2. Section 09801 - Field Applied Tape Coating System (for piping)

Contractors shall provide any other products necessary not furnished by the District for constructing and installing the waterline as specified on the project plans or these specifications.

All District furnished materials are stored at either the District's warehouse, located at 220 Tamal Vista Boulevard in Corte Madera, or the District's pipe yard, located on Pelican Way in San Rafael or in the case of hydrants, at the local fire jurisdiction. The only hydrants issued from the District's warehouse are "new" hydrants on Fire Flow Master Plan projects, unless otherwise noted on the Plans. See Standard Specification Paragraph 69 for "Materials to be obtained from the District." The pipe yard is only open on Monday, Wednesday and Friday from 8 am to 11 am.

77-1.02D Seismic Expansion Assemblies
Each seismic expansion assembly must be a flange by flange, EBAA-Iron Force Balanced Flex Tend Joint, or approved equal of sleeve-type expansion joint with integral ball joints at each end with flanged connections.

Each seismic expansion assembly must have:

1. Ability to withstand at least a 20 degree angular deflection at each end and a maximum movement in all 3 planes at the same time
2. Ductile iron body complying with ANSI/AWWA C153/A21.53
3. Flanged ends complying with ANSI/AWWA C110/A21.10
4. Fusion-bonded epoxy internal lining complying with ANSI/AWWA C213 with a minimum thickness of 15 mils
5. Internal expansion-sleeve limiting-stop collars and be pressure balanced
6. Ball joints contained in flanged retainers with seal gaskets constructed of EPDM
7. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
8. NSF 61 certification
9. Fusion-bonded epoxy external coating complying with ANSI/AWWA C116/A21.16 with a minimum thickness of 6 mils
10. Polyethylene sleeves complying with ANSI/AWWA C105/A21.5 for direct buried applications

The seismic expansion assembly must be factory set at 1/2 the extension capacity.

77-1.03 CONSTRUCTION
77-1.03A Trench Excavation and Backfill
Trench excavation and backfill must comply with the requirements in Section 3, Part 26 of the District Standards.

77-1.03B Pipe Installation
Installation of pipe must comply with the requirements in Section 3, Part 25, 27, 28, 31, and 34 of the District Standards.

77-1.03C Chlorination of Pipeline
Chlorinate and flushing of the pipe must comply with the requirements in Section 02713 – Distribution System Piping of the District specifications. Following chlorination, all treated water shall become property of the Contractor and shall be transported and disposed of in conformance with state and federal regulations and PLACs.

Install temporary blow-off valves at each end of the pipe line installation. Show locations on shop drawing submittal. Blow-off valve must comply with District Standard Drawing SD-0007 or as approved by the Engineer.

77-1.03D Restraining Piping
Pipe restraints using mechanical restraints must comply with the requirements in Section 3, Part 24 of the District Standards. Include restraint lengths in the Shop Drawing Submittal.

77-1.03E Connections to Existing Pipe
Water tie ins must comply with the requirements in Section 02713 – Distribution System Piping of the District specifications.
Expose existing piping to which connections are to be made with sufficient time to permit, where necessary, field adjustments in line, grade, or fittings.

Make connections to existing piping and valves after sections of new piping to be connected have been tested and found satisfactory.

77-1.04 PAYMENT

Waterline removal shall not be measured or paid for separately. Full compensation for the removal of water lines, fittings, valves, and any associated appurtenances and shall be included in the contract price paid for various items of work involved with waterline removal, and no additional compensation will be allowed therefor.

Contractor is directed to Section 01150 – Measurement Payment section of the District specifications for water main payment of items associated only with the District water main installation on the bridge.

18-24 LANDSCAPE IMPROVEMENTS

18-24.01 GENERAL

Section to include landscape restoration and permanent erosion control work.

18-24.02 IRRIGATION SYSTEM

Except as otherwise specified in this section, all irrigation work shall conform to Section 20-2, "IRRIGATION" of the State Standard Specifications.

18-24.02A Water Storage Tank

The Contractor shall furnish, install and secure water storage tank above ground on the concrete structure as shown on the plans and details.

The storage tank shall be manufactured with food-grade, BPA-free, High Density Polyethylene, NSF-61 compliant HDPE. The tank's capacity shall be a minimum of 325 gallons. The HDPE material shall have a long-term UV-resistant rating. The tank's net weight without content shall not exceed 110 lbs.

The tank shall have a refilling opening on top with a standard container lid with air vent. The opening shall be a minimum of 12" in diameter. The tank shall have an outlet on the bottom of one side to securely connect to the irrigation PVC pipe downstream.

The tank shall be secured onto the concrete platform per manufacturer's specifications.

18-24.02B Irrigation Controller and In-line Valve

The Contractor shall furnish and install a single-station battery operated irrigation controller and in-line irrigation valve as shown on the plans, in accordance with 20-2.10B(10) "Remote Control Valves" of the State Standard Specifications.

The controller and in-line valve shall be completely waterproof and battery powered by commercial alkaline batteries. The controller shall be operational without replacing the batteries for a minimum of 2 years. The controller shall be programable with intervals from one to thirty (1-30) days or 1 to 12 hours utilizing a yearly calendar. The controller shall be equipped with rain sensor connecting wires.

The in-line valve shall be operable at a minimum pressure of 15 PSI and flow of 0.5 GPM.

18-24.02C Rain Sensor

The Contractor shall furnish and install irrigation rain sensor as shown on the plans, in accordance with 20-2.06B(4) "Rain Sensors" of the State Standard Specifications.

18-24.02D PVC Pipe and Conduit

The Contractor shall furnish and install PVC irrigation pipe and conduit as shown on the plans and details, in accordance with 20-2.08B(5) "Plastic Pipe Supply Line" and 20-2.07B(5) " PVC Pipe Conduit Sleeve" of the State Standard Specifications.

The PVC pipe shall be UV-resistant.

18-24.02E Dripline

The Contractor shall furnish and install pressure compensating drip lines as shown on the plans, in accordance with Sections 20-2.08B(4) and 20-2.08C(3), "Drip Irrigation Tubing" of the State Standard Specifications.

The flexible polyethylene tubing shall have factory-installed pressure-compensating, inline emitters spaced evenly per listed spacing on plans. The flow rate from each installed inline emitter shall be 0.6 gph when inlet pressure is between 8.5 and 60 psi. The emitter shall have a minimum of operable pressure of 8.5 PSI. The inline emitter shall have Copper Shield Technology installed to protect the emitter from root intrusion and be raised off the inside tube wall to minimize dirt intrusion. The emitters shall have an automatic check valve that will seal the line at 4.3 psi. The inline emitter shall have a pressure-regulating diaphragm with a spring action allowing it to self-rinse if there is a plug at the outlet hole.

The dripline shall have spacing between emitters as indicated on the plans. Install dripline with orifices facing down and as shown on the plans and details.

18-24.02F Automatic Flush Valve and Valve Box

The Contractor shall furnish and install automatic flush valve as shown on the plans.

The flush valve shall be an inline compression end cap with flush valve attached to the end of the irrigation drip line. The valve shall be hydraulically operated with an opening pressure of 1 PSI and maximum operating pressure of up to 60 PSI. Material shall be high impact plastic, spring shall be stainless steel.

Valve box shall be 6" round black body plastic box. Valve box shall have durable ridges on the side wall. Valve box shall include 6" green snap-in overlapping lid.

18-24.02G Automatic Air Relief Valve and Valve Box

The Contractor shall furnish and install automatic air relief valve as shown on the plans and details.

The air vacuum relief valve shall be made with high impact plastic material, with male pipe thread connection on the bottom. Operating pressure shall be up to 100 PSI. The maximum length of dripline that can be used with one air relief valve shall be minimum of 500 feet. Air relief valve flow capacity shall be 6.5 GPM. Air relief valve dimensions shall be compact at a maximum height of 2 inches.

Valve box shall be 6" round black body plastic box. Valve box shall have durable ridges on the side wall. Valve box shall include 6" green snap-in overlapping lid.

18-24.02H Measurement and Payment

The lump sum price paid for Irrigation System, including water storage tank, irrigation controller and valve, rain sensor, PVC pipe, dripline, automatic flush valve and valve box, and automatic air release valve and valve box shall include full compensation for furnishing all labor and materials to complete all work involved in furnishing and installing the irrigation system, as specified herein and no additional compensation will be allowed.

The bid price paid for Irrigation System shall include hot test and all necessary controller programming. All components shall be new and factory manufactured using the latest upgrades and versions of software.

18-24.03 TREE PLANTING

Except as otherwise specified in this section, all tree planting work shall conform to Section 20-3, "PLANTING" of the State Standard Specifications.

18-24.03A Tree Planting

The Contractor shall furnish and install trees as shown on the plans, in accordance with Sections 20-3 "PLANTING" of the State Standard Specifications.

18-24.03B Measurement and Payment

The contract price paid per each tree shall be included in the lump sum price paid for Slope Restoration and Tree Planting, and include full compensation for furnishing all labor and materials to complete all work and cost as specified herein. No additional compensation will be allowed.

18-24.04 PERMANENT EROSION CONTOROL

Except as otherwise specified in this section, all irrigation work shall conform to Section 21, "EROSION CONTROL" of the State Standard Specifications.

18-24.04A Hydromulch and Hydroseed

The Contractor shall furnish and install hydromulch and hydroseed as shown on the plans, in accordance with Sections 21-2.03D "Hydromulch and Hydroseed" of the State Standard Specifications.

18-24.04B Rolled Erosion Control Products (netting)

The Contractor shall furnish and install rolled erosion control products (jute netting) as shown on the plans, in accordance with Sections 21-2.02O and 21-2.03O "Rolled Erosion Control Products" of the State Standard Specifications.

18-24.04C Rip Rap Rocks

The Contractor shall furnish and install rip rap rocks and boulder check dam as shown on the plans, in accordance with Sections 72-2 "ROCK SLOPE PROTECTION" and 72-4 "SMALL-ROCK SLOPE PROTECTION" of the State Standard Specifications.

18-24.04D Measurement and Payment

The contract price paid for permanent erosion control, including hydromulch and hydroseed, rolled erosion control, and rip rap rocks shall be included in the lump sum price paid for Slope Restoration and Tree Planting, and include full compensation for furnishing all labor and materials to complete all work, as specified herein and no additional compensation will be allowed.

18-24.05 LANDSCAPE MAINTENANCE

The Contractor shall guarantee and provide plant establishment for ninety (90) calendar days in accordance with Sections 20-4 "PLANT ESTABLISHMENT WORK" of the State Standard Specifications.

Final inspection shall be at the end of the plant establishment period or later as determined by the landscape inspector and the contractor.

Measurement and Payment:

90 Day Landscape Maintenance Period shall be included in the lump sum price paid for Slope Restoration and Tree Planting, and include full compensation for furnishing all labor and materials to complete all work, as specified herein and no additional compensation will be allowed.

18-24.06 RECONSTRUCT WOOD FENCE

Existing wood fence to be removed shall be reconstructed as shown on the plans, as specified in these Technical Specifications and as directed by the Engineer. Except as otherwise specified in this section, fence shall conform to the plan details and the specifications for permanent fence of similar character as provided in Section 80, "Fences," of the State Standard Specifications.

Materials may be commercial quality provided the dimensions and sizes of the materials are equal to the dimensions and sizes of the existing fence to remain.

Concrete footings for wood posts will be required.

Existing wood fence that is damaged during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this section.

Measurement and Payment:
Full compensation for reconstructing wood fence shall be considered as included in the contract price paid per linear foot for reconstruct wood fence, including painting to match existing fences, and no additional compensation will be allowed therefore.

18-24.07 GRAVITY BLOCK RETAINING WALL

GENERAL:

Work shall consist of designing, furnishing and construction of a concrete gravity block unit retaining wall system in accordance with the details shown on the plans, the State Standard Specifications, and these Technical Specifications.

QUALITY ASSURANCE:

Delivery Handling and Storage:

A. Contractor shall check all materials upon delivery to assure that the proper type, grade, color, and certification have been received.

B. Contractor shall protect all materials from damage due to jobsite conditions and in accordance with manufacturer's recommendations. Damaged materials shall not be incorporated into the work.

PRODUCTS:

Concrete Gravity Block Units:

A. Concrete Gravity Block retaining wall units shall conform to the following architectural requirements:

    1. Block Unit – a dry-stacked concrete retaining wall unit machine made from Portland cement, water, aggregates, manufactured by a licensed manufacturer of Keystone or approved equal.

    2. Face color - concrete gray, unless directed otherwise by the Engineer.

    3. Face finish - hard split in angular tri-plane or straight face configuration. Other face finishes will not be allowed without written approval of Engineer.

    4. Bond configuration - running with bonds nominally located at midpoint in vertically adjacent units.

    5. Exposed surfaces of units shall be free of chips, cracks or other imperfections when viewed from a distance of 20 feet (6 m) under diffused lighting.

B. Concrete Gravity Block units shall conform to the requirements of ASTM C1372 - Standard Specifications for Segmental Retaining Wall Units.

C. Concrete Gravity Block units shall conform to the following structural and geometric requirements measured in accordance with ASTM C140 Sampling and Testing Concrete Masonry Units:

1. Compressive strength: ≥ 3000 psi (21 MPa).
2. Absorption: ≤ 8 % for standard weight aggregates.
3. Dimensional tolerances: ± 1/8" (3 mm) from nominal unit dimensions not including rough split face.
4. Unit Size: 8" (203 mm) (H) x 18" (457 mm) (W) x 18" (457 mm)(D) minimum.

D. Concrete Gravity Block units shall conform to the following constructability requirements:

1. Vertical setback: 1/8 inch (3 mm) ± per course (near vertical) or 1 1/8 inch (28 mm) + per course, per the design.
2. Alignment and grid attachment mechanism - fiberglass pins, two per unit.
3. Maximum horizontal gap between erected units shall be ≤ 1/2 inch (13 mm).

EXECUTION:

Concrete Gravity Block Unit Installation:

A. First course of units shall be placed on a level surface at the appropriate line and grade. Alignment and level shall be checked in all directions and insure that all units are in full contact with the base and properly seated.

B. Place the front of units side-by-side. Do not leave gaps between adjacent units. Layout of corners and curves shall be in accordance with manufacturer's recommendations.

C. Install shear/connecting pins per manufacturer's recommendations.

D. Place and compact aggregate base behind units.

E. Maximum stacked vertical height of wall units, prior to backfill placement and compaction, shall not exceed two courses.

Cap Unit Installation:

A. Prior to placement of the cap units, the upper surface of the top course of wall units shall be cleaned of soil and any other material.

B. Cap units shall be adequately glued to the underlying wall units with an all-weather exterior construction adhesive.

As-built Construction Tolerances:

A. Vertical alignment: ± 1.5 inches (40 mm) over any 10 foot (3 m) distance.

B. Wall batter: within 2 degrees of design batter. Overall wall batter shall be ≥ 0 degrees.

C. Horizontal alignment: ± 1.5 inches (40 mm) over any 10 foot (3 m) distance.

D. Corners and curves: ± 1 foot (300 mm) to theoretical location.

E. Maximum horizontal gap between erected units shall be ≤ 1/2 inch (13 mm).

Field Quality Control:

A. Quality Assurance – The Engineer may engage inspection and testing services, including independent laboratories, to provide quality assurance and testing services during construction. This does not relieve the Contractor from securing the necessary construction quality control testing.

B. Quality assurance should include foundation soil inspection and testing and verification of the geotechnical design parameters and verification that the contractor's quality control testing is adequate as a minimum. Quality assurance shall also include observation of the construction for general compliance with the design drawings and project specifications. Quality assurance is usually best performed by the site geotechnical engineer.

C. Quality Control – The Contractor shall engage independent inspection and testing services to perform the minimum quality control testing described in the retaining wall design plans and specifications. Only qualified and experienced technicians and engineers shall perform quality control testing and inspection services.

D. Quality control testing shall include soil and backfill testing to verify soil types and strengths, compaction and moisture conditions and verification that the retaining wall is being constructed in accordance with the design plans and specifications.

MEASUREMENT AND PAYMENT:

Gravity Block Retaining Wall will be measured and paid for by the square foot. The square foot area for payment will be based on the length and vertical height of each section of Gravity Block Retaining Wall that is constructed. The vertical height of each section will be taken as the difference in elevation on the outer face from the top of the leveling pad to the top of wall profile.

The contract price paid per square foot for Gravity Block Retaining Wall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in designing and constructing concrete gravity block retaining walls, including shoring and bracing, and earthwork, complete in place, as shown on the plans, as specified in these Technical Specifications, and as directed by the Engineer, and no additional payment will be allowed therefore.

ELECTRICAL TECHNICAL SPECIFICATIONS

ORGANIZATION

Technical Specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*.

Each technical specification begins with a revision clause that describes or introduces a revision to the *Standard Specifications* as revised by any revised standard specification.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the *Standard Specifications* for any other reference to a paragraph of the *Standard Specifications*.

18-25 BRIDGE LIGHTING

The work consists of constructing and installing bridge lighting system in conformance with the provisions in Section 77, "Local Infrastructure," of the State Standard Specifications and these Technical Specifications.

Add to the end of section 77:

77-2 BRIDGE LIGHTING SYSTEM

77-2.01 GENERAL

77-2.01A Summary

Section 77-2 includes specifications for bridge lighting system for City street.

Bridge lighting system for City street including:

1. Foundations
2. Pull boxes/junction boxes
3. Conduit
4. Conductors
5. Mounting brackets and timber blocks
6. Luminaires
7. Service equipment enclosure
8. Photoelectric control

The components of bridge lighting system for City street are shown on the project plans.

77-2.02 MATERIALS

The electrical materials must comply with section 86.

The luminaire must be 9-watt LED wall-mounted type luminaire as shown on the plan.

77-2.03 CONSTRUCTION

Install electrical material under section 87.

77-2.04 PAYMENT

The contract lump sum price paid for Bridge Lighting shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing bridge lighting system for City street, complete in place, including all the mounting brackets, NEMA 3 outdoor

type junction boxes and conduit clamps as shown on the plan, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

18-26 GENERAL

The work consists of furnishing electrical equipment and materials in conformance with the provisions in Section 86, "General," of the State Standard Specifications and these Technical Specifications.

Replace the 1st paragraph of section 86-1.01D(3) with:

Deliver the material and equipment for testing as requested to the following location:

City of San Rafael Corporation Yard located at 111 Morphew Street

Add to the list in the 4th paragraph of the RSS for section 86-1.02C(1):

15. *CITY LIGHTING* for City street lighting system

Add to the end of section 86-1.02F(2)(a):

All conductors must be copper.

Replace *insulated* in the 2nd paragraph of the RSS for section 86-1.02F(2)(c)(ii) with:

Bare

Replace the 1st sentence in the 15th paragraph of section 86-1.02P(2) with:

The interior of the enclosure must accept cable-in/cable-out circuit breakers. The circuit breakers must be mounted on nonenergized clips and vertically with the up position of the handle being the *ON* position.

Add to the end of section 86-1.02P(2):

Provide a clearance of 24 inches minimum between the bottom of the lowest circuit breaker and the bottom of the service equipment enclosure for a Type III-A series.

18-27 ELECTRIAL SYSTEMS

The work consists of constructing and installing electrical systems in conformance with the provisions in Section 86, "Electrical Systems," of the State Standard Specifications and these Technical Specifications.

Add between the 1st and 2nd paragraphs of section 87-1.01A:

Constructing and installing electrical systems must comply with part 4 of the *California MUTCD* and 8 CA Code of Regs, chapter 4, subchapter 5, "Electrical Safety Orders."

Add to the beginning of section 87-1.03B(3)(a):

Use Type 3 conduit for underground installation.

Replace the 3rd paragraph of section 87-1.03C(1) with:

Install a pull box on a bed of crushed rock.

Replace the 2nd paragraph of section 87-1.03H(2) with:

Use Method B to insulate a splice.

APPENDIX A
CALTRANS 2018 STANDARD PLAN LIST

The standard plan sheets applicable to this Contract include those listed below.

ABBREVIATIONS, LINES, SYMBOLS, AND LEGEND

A3A	Abbreviations (Sheet 1 of 3)
A3B	Abbreviations (Sheet 2 of 3)
A3C	Abbreviations (Sheet 3 of 3)
A10A	Legend - Lines and Symbols (Sheet 1 of 5)
A10B	Legend - Lines and Symbols (Sheet 2 of 5)
A10C	Legend - Lines and Symbols (Sheet 3 of 5)
A10D	Legend - Lines and Symbols (Sheet 4 of 5)
A10E	Legend - Lines and Symbols (Sheet 5 of 5)
A10F	Legend - Soil (Sheet 1 of 2)
A10G	Legend - Soil (Sheet 2 of 2)
A10H	Legend - Rock

PAVEMENT MARKERS, TRAFFIC LINES, AND PAVEMENT MARKINGS

A20A	Pavement Markers and Traffic Lines - Typical Details
RSP A20B	Pavement Markers and Traffic Lines - Typical Details
A24D	Pavement Markings - Words

EXCAVATION AND BACKFILL

A62A	Excavation and Backfill - Miscellaneous Details
A62B	Limits of Payment for Excavation and Backfill - Bridge Surcharge and Wall
A62C	Limits of Payment for Excavation and Backfill - Bridge
A62F	Excavation and Backfill - Metal and Plastic Culverts

OBJECT MARKERS, DELINEATORS, CHANNELIZERS, AND BARRICADES

RSP A73B	Markers
A73C	Delineators, Channelizers and Barricades

SURVEY MONUMENTS

A74	Survey Monuments

FENCES

A84A	Temporary Desert Tortoise Fence
RSP A84B	Desert Tortoise Fence

CURBS, DRIVEWAYS, DIKES, CURB RAMPS, AND ACCESSIBLE PARKING

A87A	Curbs and Driveways
A87B	Hot Mix Asphalt Dikes

PIPE DOWNDRAINS, ANCHORAGE SYSTEMS AND OVERSIDE DRAINS

D87B	Plastic Pipe Downdrain Details
D87C	Cable Anchorage System

TEMPORARY CRASH CUSHIONS, RAILING AND TRAFFIC SCREEN

T1A	Temporary Crash Cushion, Sand Filled (Unidirectional)
T1B	Temporary Crash Cushion, Sand Filled (Bidirectional)
T2	Temporary Crash Cushion, Sand Filled (Shoulder Installations)
T3A	Temporary Railing (Type K)
T3B	Temporary Railing (Type K)

TEMPORARY WATER POLLUTION CONTROL

T51	Temporary Water Pollution Control Details (Temporary Silt Fence)
T52	Temporary Water Pollution Control Details (Temporary Straw Bale Barrier)
T53	Temporary Water Pollution Control Details (Temporary Cover)
T54	Temporary Water Pollution Control Details (Temporary Erosion Control Blanket)
T55	Temporary Water Pollution Control Details (Temporary Erosion Control Blanket)
T56	Temporary Water Pollution Control Details (Temporary Fiber Roll)
T57	Temporary Water Pollution Control Details (Temporary Check Dam)
T58	Temporary Water Pollution Control Details (Temporary Construction Entrance)
T59	Temporary Water Pollution Control Details (Temporary Concrete Washout Facility)
T60	Temporary Water Pollution Control Details (Temporary Reinforced Silt Fence)
T61	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)

T62	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T63	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T64	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T65	Temporary Water Pollution Control Details (Temporary High-Visibility Fence)
T66	Temporary Water Pollution Control Details (Temporary Large Sediment Barrier)
	BRIDGE DETAILS
RSP B0-1	Bridge Details
B0-3	Bridge Details
B0-13	Bridge Details
	PILES
B2-3	16" and 24" Cast-In-Drilled-Hole Concrete Pile
	RETAINING WALLS
B3-6	Retaining Wall Details No. 2
	JOINT SEALS
B6-21	Joint Seals (Maximum Movement Rating = 2")
	STRUCTURE APPROACH
B9-1	Structure Approach - Type N (30)
B9-5	Structure Approach - Slab Details
	COMMUNICATION AND SPRINKLER CONTROL CONDUITS (BRIDGE)
B14-3	Communication and Sprinkler Control Conduits (Conduit Less Than 4")
	ROADSIDE SIGNS
RS1	Roadside Signs - Typical Installation Details No. 1
RS2	Roadside Signs - Wood Post - Typical Installation Details No. 2
RS4	Roadside Signs - Typical Installation Details No. 4
	ELECTRICAL SYSTEMS - LEGEND
RSP ES-1A	Electrical Systems (Legend)
RSP ES-1B	Electrical Systems (Legend)
RSP ES-1C	Electrical Systems (Legend)
	ELECTRICAL SYSTEMS - SERVICE EQUIPMENT AND WIRING DIAGRAMS
RSP ES-2A	Electrical Systems (Service Equipment)
RSP ES-2D	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram, Type III - A Series)
	ELECTRICAL SYSTEMS - PULL BOX
RSP ES-8B	Electrical Systems (Traffic Pull Box)
	ELECTRICAL SYSTEMS - STRUCTURE INSTALLATIONS
ES-9A	Electrical Systems (Structure Pull Box Installations)
ES-9B	Electrical Systems (Conduit Riser and Expansion Fitting, Structure Installations)
	ELECTRICAL SYSTEMS - SPLICE INSULATION METHODS, KINKING AND BANDING DETAILS
ES-13A	Electrical Systems (Splice Insulation Methods Details)

APPENDIX B
CITY OF SAN RAFAEL POLLUTION PREVENTION REQUIREMENTS

CITY OF SAN RAFAEL

POLLUTION PREVENTION: IT'S PART OF THE PLAN

MAKE SURE YOUR CREWS AND SUBS DO THE JOB RIGHT!

RUNOFF FROM STREETS AND OTHER PAVED AREAS IS A MAJOR SOURCE OF POLLUTION IN SAN FRANCISCO BAY. CONSTRUCTION ACTIVITIES CAN DIRECTLY AFFECT THE HEALTH OF THE BAY UNLES CONTRACTORS AND CREWS PLAN AHEAD TO KEEP DIRT, DEBRIS, AND OTHER CONSTRUCITON WASTE AWAY FROM STORM DRAINS AND LOCAL CREEKS. FOLLOWING THESE GUIDELINES WILL ENSURE YOUR COMPLIANCE WITH CITY OF SAN RAFAEL ORDINANCE REQUIREMETNS.

CITY OF SAN RAFAEL
STORM WATER PROGRAM
(415) 485-3355

MATERIALS STORAGE & SPILL CLEANUP

NON-HAZARDOUS MATERIALS MANAGEMENT

- SAND, DIRT, AND SIMILAR MATERIALS MUST BE STORED AT LEAST 10 FEET FROM CATCH BASINS, AND COVERED WITH A TARP DURING WET WEATHER OR WHEN RAIN IS FORECAST
- USE (BUT DON'T OVERUSE) RECLAIMED WATER FOR DUST CONTROL AS NEEDED
- SWEEP STREETS AND OTHER PAVED AREAS DAILY. DO NOT WASH DOWN STREETS OR WORK AREAS WITH WATER!
- RECYCLE ALL ASPHALT, CONCRETE, AND AGGREGATE BASE MATERIAL FROM DEMOLITION ACTIVITIES.
- CHECK DUMPSTERS REGULARLY FOR LEAKS AND TO MAKE SURE THEY DON'T OVERFLOW. REPAIR OR REPLACE LEAKING DUMPSTERS PROMPTLY.

HAZARDOUS MATERIALS MANAGEMENT

- LABEL ALL HAZARDOUS MATERIALS AND HAZARDOUS WASTES (SUCH AS PESTICIDES, PAINTS, THINNERS, SOLVENTS, FUEL, OIL, AND ANTIFREEZE) IN ACCORDANCE WITH CITY, STATE, AND FEDERAL REGULATIONS.
- STORE HAZARDOUS MATERIALS AND WASTES IN SECONDARY CONTAINMENT AND COVER THEM DURING WET WEATHER
- FOLLOW MANUFACTURER'S APPLICATION INSTRUCTIONS FOR HAZARDOUS MATERIALS AND BE CAREFUL NOT TO USE MORE THAN NECESSARY. DO NOT APPLY CHEMICALS OUTDOORS WHEN RAIN IS FORECAST WITHIN 24 HOURS.
- BE SURE TO ARRANGE FOR APPROPRIATE DISPOSAL OF ALL HAZARDOUS WASTES.

SPILL PREVENTION AND CONTROL

- KEEP A STOCKPILE OF SPILL CLEANUP MATERIALS (RAGS, ABSORBENTS, ETC.) AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES.
- WHEN SPILLS OR LEAKS OCCUR, CONTAIN THEM IMMEDIATELY AND BE PARTICULARLY CAREFUL TO PREVENT LEAKS AND SPILLS FROM REACHING THE GUTTER, STREET, OR STORM DRAIN. NEVER WASH SPILLED MATERIAL INTO A GUTTER, STREET, STORM DRAIN OR CREEK!
- REPORT ANY HAZARDOUS MATERIALS SPILLS IMMEDIATELY! CALL CITY OF SAN RAFAEL FIRE DEPARTMENT AT (415) 485-3308.

VEHICLE AND EQUIPMENT MAINTENANCE & CLEANING

- INSPECT VEHICLES AND EQUIPMENT FOR LEAKS FREQUENTLY. USE DRIP PANS TO CATCH LEAKS UNTIL REPAIRS ARE MADE; REPAIR LEAKS PROMPTLY
- FUEL AND MAINTAIN VEHICLES ON SITE ONLY IN A BERMED AREA OR OVER A DRIP PAN THAT IS BIG ENOUGH TO PREVENT RUNOFF
- IF YOU MUST CLEAN VEHICLES OR EQUIPMENT ON SITE, CLEAN WITH WATER ONLY IN A BERMED AREA THAT WILL NOT ALLOW RINSEWATER TO RUN INTO GUTTERS, STREETS, STORM DRAINS, OR CREEKS
- DO NOT CLEAN VEHICLES OR EQUIPMENT ON-SITE USING SOAPS, SOLVENTS, DEGREASERS, STEAM CLEANING EQUIPMENT, ETC.

EARTHWORK & CONTAMINATED SOILS

- KEEP EXCAVATED SOIL ON THE SITE WHERE IT IS LEAST LIKELY TO COLLECT IN THE STREET. TRANSFER TO DUMP TRUCKS SHOULD TAKE PLACE ON THE SITE, NOT IN THE STREET.
- USE HAY BALES, SILT FENCES, OR OTHER CONTROL MEASURES TO MINIMIZE THE FLOW OF SILT OFF THE SITE.
- AVOID SCHEDULING EARTH MOVING ACTIVITIES DURING THE RAINY SEASON IF POSSIBLE. IF GRADING ACTIVITIES DURING WET WEATHER ARE ALLOWED IN YOUR PERMIT, BE SURE TO IMPLEMENT ALL CONTROL MEASURES NECESSARY TO PREVENT EROSION.
- MATURE VEGETATION IS THE BEST FORM OF EROSION CONTROL. MINIMIZE DISTURBANCE TO EXISTING VEGETATION WHENEVER POSSIBLE.
- IF YOU DISTURB A SLOPE DURING CONSTRUCITON, PREVENT EROSION BY SECURINT THE SOIL WITH EROSION CONTROL FABRIC, OR SEED WITH FAST-GROWING GRASSES AS SOON AS POSSIBLE. PLACE HAY BALES DOWN-SLOPE UNTIL SOIL IS SECURE.
- IF YOU SUSPECT CONTAMINATION (FROM SITE HISTORY, DISCOLORATION, ODOR, TEXTURE, ABANDONED UNDERGROUND TANKS OR PIPES, OR BURIED DEBRIS), CALL THE FIRE DEPT., (415) 485-3308, FOR HELP IN DETERMINING WHAT TESTING SHOULD BE DONE.
- MANAGE DISPOSAL OF CONTAMINATED SOIL ACCORDING TO FIRE DEPARTMENT INSTRUCTIONS.

DEWATERING OPERATIONS

- REUSE WATER FOR DUST CONTROL, IRRIGATION, OR ANOTHER ON-SITE PURPOSE TO THE GREATEST EXTENT POSSIBLE.
- BE SURE TO CALL THE CITY'S STORMWATER MANAGER BEFORE DISCHARGING WATER TO A STREET, GUTTER, OR STORM DRAIN. CALL THE STORMWATER MANAGER AT (415) 485-3355. FILTRATION OR DIVERSION THROUGH A BASIN, TANK, OR SEDIMENT TRAP MAY BE REQUIRED.
- IN AREAS OF KNOWN CONTAMINATION, TESTING IS REQUIRED PRIOR TO REUSE OR DISCHARGE OF GROUNDWATER. CONSULT WITH THE CITY FIRE DEPT. TO DETERMINE WHAT TESTING TO DO AND TO INTERPRET RESULTS. CONTAMINATED GROUNDWATER MUST BE TREATED OR HAULED OFF-SITE FOR PROPER DISPOSAL.

SAW CUTTING

- ALWAYS COMPLETELY COVER OR BARRICADE STORM DRAIN INLETS WHEN SAW CUTTING. USE FILTER FABRIC, HAY BALES, SAND BAGS, OR FINE GRAVEL DAMS TO KEEP SLURRY OUT OF THE STORM DRAIN SYSTEM.
- SHOVEL, ABSORB, OR VACUUM SAW-CUT SLURRY AND PICK UP ALL WASTE AS SOON AS YOU ARE FINISHED IN ONE LOCATION OR AT THE END OF EACH WORK DAY (WHICHEVER IS SOONER).
- IF SAW CUT SLURRY ENTERS A CATCH BASIN, CLEAN IT UP IMMEDIATELY.

PAVING/ASPHALT WORK

- DO NOT PAVE DURING WET WEATHER OR WHEN RAIN IS FORECAST.
- ALWAYS COVER STORM DRAIN INLETS AND MANHOLES WHEN PAVING OR APPLYING SEAL COAT, TACK COAT, SLURRY SEAL, OR FOG SEAL.
- PLACE DRIP PANS OR ABSORBENT MATERIAL UNDER PAVING EQUIPMENT WHEN NOT IN USE.
- PROTECT GUTTERS, DITCHES, AND DRAINAGE COURSES WITH HAY BALES, SAND BAGS, OR EARTHEN BERMS.
- DO NOT SWEEP OR WASH DOWN EXCESS SAND FROM SAND SEALING INTO GUTTERS, STORM DRAINS, OR CREEKS. COLLECT SAND AND RETURN IT TO THE STOCKPILE, OR DISPOSE OF IT AS TRASH.
- DO NOT USE WATER TO WASH DOWN FRESH ASPHALT CONCRETE PAVEMENT.

CONCRETE, GROUT, AND MORTAR STORAGE & WASTE DISPOSAL

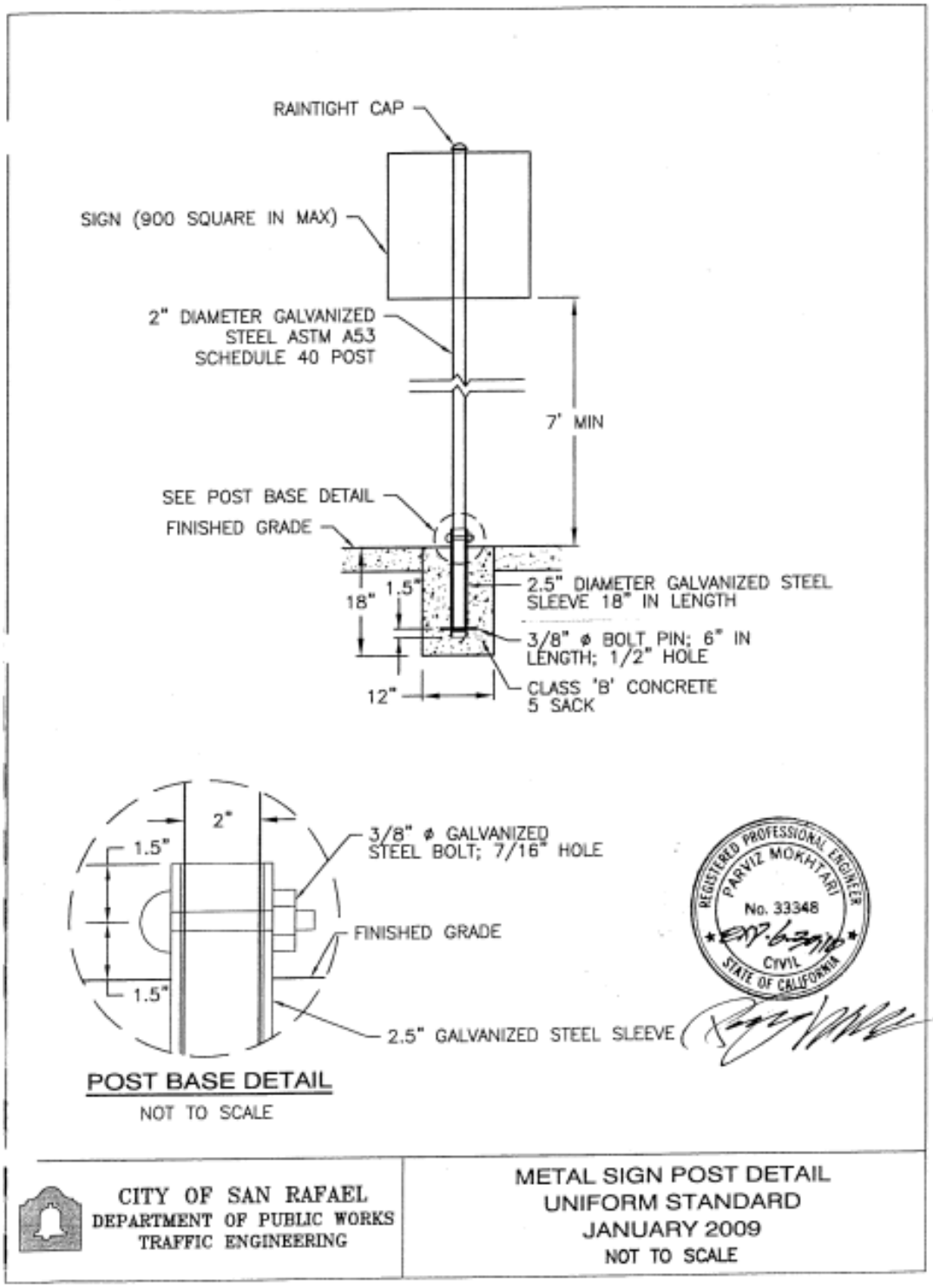
- BE SURE TO STORE CONCRETE, GROUT AND MORTAR UNDER COVER AND AWAY FROM DRAINAGE AREAS. THESE MATERIALS MUST NEVER REACH A STORM DRAIN.
- WASH OUT CONCRETE EQUIPMENT/TRUCKS OFF-SITE OR DESIGNATE AN ON-SITE AREA FOR WASHING WHERE WATER WILL FLOW ONTO DIRT OR INTO A TEMPORARY PIT IN A DIRT AREA. LET THE WATER SEEP INTO THE SOIL AND DISPOSE OF HARDENED CONCRETE WITH TRASH.
- IF A SUITABLE DIRT AREA IS NOT AVAILABLE, COLLECT THE WASH WATER AND REMOVE IT FOR APPROPRIATE DISPOSAL OFF SITE.
- DIVERT WATER FROM WASHING EXPOSED AGGREGATE CONCRETE TO A DIRT AREA WHERE IT WILL NOT RUN INTO A GUTTER, STREET, OR STORM DRAIN. IF A SUITABLE DIRT AREA IS NOT AVAILABLE, FILTER THE WASH WATER THROUGH HAY BALES BEFORE DISCHARGING TO A STORM DRAIN.

PAINTING

- NEVER RINSE PAINT BRUSHES OR MATERIALS IN A GUTTER OR STREET.
- PAINT OUT EXCESS WATER-BASED PAINT BEFORE RINSING BURHSES, ROLLERS, OR CONTAINERS IN A SINK. IF YOU CAN'T USE A SINK, DIRECT WASH WATER TO A DIRT AREA AND SPADE IT IN.
- PAINT OUT EXCESS OIL-BASED PAINT BEFORE CLEANING BRUSHES IN THINNER.
- FILTER PAINT THINNERS AND SOLVENTS FOR REUSE WHENVER POSSIBLE. DISPOSE OF OIL-BASED PAINT SLUDGE AND UNUSABLE THINNER AS HAZARDOUS WASTE.

STORM DRAIN POLLUTERS MAY BE LIABLE FOR FINES OF UP TO $500 PER DAY

APPENDIX C
CITY OF SAN RAFAEL SIGN POST
INSTALLATION DETAIL



APPENDIX D
MMWD HYDRANT METER USE PERMIT

MARIN MUNICIPAL WATER DISTRICT
220 NELLEN AVE, CORTE MADERA 94925
(415) 945-1530

SUNDRY PERMIT DEPOSIT
HYDRANT METER

DATE:	
BILL TO:	
ADDRESS:	
PHONE:	**CELL:**
CONTACT PERSON:	
LOCATION:	
INTENDED USE:	
ESTIMATED COMPLETION DATE:	
☐ **1" METER $350**	☐ **3" METER $1,400**
METER SET DATE:	**DATE RETURNED:**
OFFICE USE BELOW	
BP NO.	**PREMISE# 5000061792**
METER NO:	**READ OUT:**
SERVICE NO:	**HYDRANT NO:**
DEPOSIT CHECK NO:	**MAP NO.**
CONTRACT ACCT. NO:	

DISTRIBUTION

DESCRIPTION	**WORK ORDER NO.**
☐ Initial Set Charge ($85)	
☐ Relocation Chg ($65)	
☐ Retrieval Chg ($65)	
3" Meter Chg $6.02 p/d x	
1" Meter Chg. $1.10 p/d x	
CCFs @ $6.11 ea.	
SUBMITTED BY:	

Marin Municipal Water District
Hydrant Meter Use Permit

General Conditions:

1. A copy of this permit must be in possession of the person taking water at all times.
2. The hydrant shall be opened and closed slowly only at the start and end of each day's work, water flow is to be controlled through the gate valve supplied for that purpose.
3. All water use shall be through the hydrant meter assembly.
4. Hydrant meters are to be used for construction purposes only and are not to be used for irrigation or to provide service to any structure directly or indirectly.
5. Tanks or tank trucks shall have an external fill line and an air gap permanently mounted. Tanks shall have a sign (12"x 12" min.) reading NON-POTABLE WATER-DO NOT DRINK.
6. Hydrant meter assemblies require regular maintenance. Applicant shall make available to MMWD any hydrant meter assembly immediately upon request.
7. Applicant shall not alter any hydrant meter assembly in any manner.
8. District reserves the right to discontinue service and take possession of the meter and appurtenances for non-compliance with any of the above or water waste.
9. A charge will be assessed for reinstatement of any hydrant meter assembly retrieved for any of the above reasons.
10. Long-term rentals require water usage to be reported to the District approximately every 60 days. Call 415-945-1174.
11. All water to be used within District boundaries and must not be resold.

Applicant Signature_____ Date _____

APPENDIX E
MMWD CONSTRUCTION STANDARDS

SECTION 01150

MEASUREMENT AND PAYMENT

GENERAL

SCHEDULE OF PAYMENTS

Monthly progress payments will be made based on the pro rata value of the actual work completed as of 30 days after the Notice-to-Proceed, and every 30 days thereafter, and otherwise in accordance with MMWD General Specifications, Item 77: Progress Payments. The progress payment will be initiated by the foreman arranging a meeting with the Inspector to review the estimate of total work completed for the current pay period. The Inspector will submit the reviewed estimated quantities to the Engineer for approval. The District will pay the Contractor within 20 days of after completion of the field review by the Inspector and the foreman. In the case of disagreements between the contractor and the District as to the amount of progress payment monies due, the Engineer's estimate shall be final. Final payment will be made upon completion of work in accordance with MMWD General Specifications, Item 79: Final Estimate and Payment.

SCOPE OF PAYMENT

The work has been broken down into several unit price and lump sum items for convenience in measuring progress for payment.

It is recognized that due to the "interconnected nature" of construction, specific separation of work into bid items is not always possible; generally only the major involved items are specified herein. However, all of the work under the contract for a complete project is included in these items, and no claims for extra work will be allowed for any item shown on the plans or required by the Specifications.

The Contractor shall accept the compensation provided in the Contract as full payment for furnishing all labor, materials not furnished by the District, tools, equipment, and incidentals necessary for performing all work contemplated and embraced under the Contract; also for loss or damage arising from the nature of the work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work, until the work is accepted by the District; and for all risks of every description connected with the prosecution of the work, also for all expense incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the Contract Documents. Neither the payment of any

estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

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

Except as specifically provided otherwise, no separate payment will be made for any of the requirements of the General Specifications, the Special Provisions, nor for any of the work specified in Division 1 Sections of the Specifications, and the cost thereof will be considered as included in the prices paid for the various contract items included in the Bid.

LUMP SUM PRICES

Work under Contract lump sum prices listed in the Bid Sheet Schedule will be paid based on prorata completion of that work and as specified under Section 1.1 Basis for Progress Payment.

UNIT PRICES

For items bid on a unit price basis, the estimated quantities given in the Bid Form are approximate and are given only as a basis for comparison of bids. The District does not expressly, nor by implication, warrant that the actual amount of work will correspond to the estimated quantities. The District reserves the right to increase or decrease the amount of work performed under unit price Bid Items, or to omit such work altogether unless such change exceeds 25 percent of the total contract bid price. No adjustments to the Contract unit prices will be made, nor will any claim for loss of anticipated profit be allowed on account of any such increase, decrease, or omission. Payment for unit price Bid Items will be made at the Contract unit prices stated in the Contractor's Bid, for the quantities of work directed by the Engineer to be performed and actually performed, measured as specified below.

PARTIAL PAYMENTS

The partial payments for all distribution piping work shall estimate on the basis of the following schedule of completion percentages:

BID ITEM	WORK COMPLETED	PARTIAL PAYMENT
1, 2, 3, 5, 6, 10, 11Pipe, Fittings, Contractor Furnished Items, Sand, Class 2 Aggregate	In the Ground Passed Pipeline Testing, Flushing and Disinfection Complete	75% 90% 100%
4, 7, 8, 9, 12, 13, 14 Make Connections to Existing Pipe, Pavement Cut, Pavement Removal, Trench Excavation, Permanent Pavement, Sheeting and Shoring, Excavation of Rock	Complete	100%

CHANGE ORDERS

Whenever corrections, alterations, or modifications in the work under this Contract change the amount of compensation due the Contractor, such changes must first be approved by an executed change order stating the agreed upon price. Upon failing to reach an agreement on price and/or the execution of a change order, the Contractor shall perform all such extra work when ordered in writing by the Engineer and will be compensated in accordance with Article 42 of the General Specifications.

SCHEDULE OF BID ITEMS

Install Welded Steel Pipe

Payment of the contract unit price shall constitute full compensation for furnishing all labor, equipment and those materials not furnished by the District required for transportation of materials, traffic control, trench dewatering, installation of Corrosion Test Stations (CTS), and installation of pipe, fabricating and furnishing bridge mount pipe supports, anchorage, fastening hardware, complete in place, all as shown on the Plans, as required by the Specifications or as directed by the Engineer.

Payment for PVC insulator pipe shall be included in this item.

The payment quantity for this item shall be the straight-line distance of the new mainline piping, on finish grade, as measured from one point of connection to the other point of connection on the existing mainlines with no breaks at valve assemblies or fittings.

Hydrant piping runs and fireline piping shall be paid under this item. The payment quantity shall be from the measured distance from the centerline of the mainline pipe to the centerline of the hydrant bury or fireline point of connection.

In addition to payments made for pipe installation, payment for the installation of valves, fittings, connections to existing pipe, pavement cutting, pavement removal, and excavation shall be made under separate bid items provided in these specifications.

Pipeline Disinfection

Payment of the contract lump sum price shall constitute full compensation for furnishing all labor, equipment and those materials not furnished by the District required to complete the flushing and disinfection operations for all new facilities installed as shown on the Drawings, as required by the Specifications or as directed by the Engineer.

The payment quantity for this item shall be on a lump sum basis. All work necessary under this bid item shall be included in the lump sum price. In addition, all labor, material and equipment to install temporary fittings and piping to divert flushing water to natural drainage, temporary pressure gauge, double check valve backflow prevention device and chlorine residual measurement equipment shall be included in the lump sum price. No other payment shall be made for this work.

Install Pipe Fittings - Welded and

Install Pipe Fittings – Non-Welded

Payment of the contract price shall constitute full compensation for furnishing all labor, equipment and those materials not furnished by the District required to install pipe fittings for installation, complete in place, all as shown on the Drawings, required by the Specifications or as directed by the Engineer.

The payment quantity for this item shall be the number of pipe fittings actually installed as required by the Drawings or as directed by the Engineer. All work necessary to install pipe fittings complete shall be included in the contract price. A completed fitting includes the required companion flanges, glands or couplings, to make the connection to the pipeline or the trimming of weld elbows to change the pipeline grade, slope or horizontal direction required to accomplish the pipe layout.

Payment for concrete or redwood blocking of fittings shall be included in the bid price for each fitting under this bid item.

Fittings shall be paid for under the Welded Pipe Fittings bid item if any one of the connections to the pipeline is to be made by welding.

Make Connections to Existing Pipelines

Payment of the contract price shall constitute full compensation for furnishing all labor, equipment and those materials not furnished by the District, required: to test, flush, assist in chlorination and make connections of new to old piping; make associated temporary cut and plugs on the existing pipelines; and make permanent abandonment of the existing piping, all as shown on the Drawings, required by the Specifications or as directed by the Engineer. A connection is defined as the work associated with restoring

complete pipeline continuity at a cut in the existing piping. Offset connections shall be considered one connection complete in place.

The payment quantity for this item shall be for the number of connections actually made, as required by the Drawings or as directed by the Engineer. All work necessary under this bid item shall be included in the bid price for each connection as indicated by the Engineer. In addition, all labor and material to install temporary fittings and thrust restraint for interim use of both the new and old mains before final connections shall be included under the bid price for each connection. In addition, all costs associated with installing connection piping and fittings 2-inches in diameter and smaller shall be included under this bid item.

All material and work necessary for the installation of temporary blowoff assemblies for flushing, complete, shall be included in the bid price for each connection. No other payment shall be made for this work.

All labor, equipment, and those materials not furnished by the District for the special cut and plugs (those not within proximity of the connection excavation) complete, including fittings, pipe and restoration, shall be included in a separate bid price under this item. No other payment shall be made for this work.

Furnish and Install Seismic Connection

Payment of the contract price shall constitute full compensation for furnishing all labor, equipment and materials not furnished by the District, required to furnish and install 6-inch flange by flange EBAA-Iron Force Balanced Flex-Tend Joint connection or approved equal, complete in place per the manufactures recommended installation, as shown on the Drawings, required by the Specifications or as directed by the Engineer. All work necessary under this bid item shall be included in the bid price for each seismic connection and no other payment shall be made for this work.

The payment quantity for this item shall be the number of seismic connections actually installed as required by the Drawings or as directed by the Engineer.

Furnish and Install Air Relief Valve

Payment of the contract price shall constitute full compensation for furnishing all labor, equipment and materials not furnished by the District, required to furnish and install a 2-inch APCO AVR-1502T Air Relief Valve or approved equal, complete in place per the manufactures recommended installation, including companion fittings to attach to bridge mounted pipe, as shown on the Drawings, required by the Specifications or as directed by the Engineer. All work necessary under this bid item shall be included in the bid item price for this item and no other payment shall be made for this work.

Pavement Cut

Payment of the contract price shall constitute full compensation for the furnishing of all labor, material and equipment necessary to cut existing asphalt, concrete, or any other

type of pavement surface complete for use as shown on the Drawings, required by the Specifications or as directed by the Engineer.

The number of lineal feet to be paid under this item shall be calculated as a measurement of the actual length of pie installed multiplied by the number of cuts required by the Drawings and Specifications and completed. No additional payment shall be made for cuts at bell holes for joint, valves or fittings or for additional cuts required in areas damaged by the Contractor's operations. No payment shall be made for pavement cuts required for service pipe installation. Where a second cut is specified, the first cuts may be by grinding and will be paid as a pavement cut. No payment shall be made under this item for second cut work that is done by grinding. Payment for service pavement cutting shall be made only under the "Install Copper Service Pipe" bid item.

Pavement Removal

Payment of the contract price shall constitute full compensation for the furnishing of all labor, materials and equipment necessary to score, remove and dispose existing asphalt, concrete, or any other type of pavement, including abandoned surface facilities, as shown on the Drawings, required by the Specifications or as directed by the Engineer.

The number of square feet to be paid for under this item shall be calculated as a measurement of pavement removal width as shown in the trench section on the Drawings using nominal pipe diameter and the length as determined in the pipeline bid items. No additional payment shall be made for pavement removal at bell holes for joints, valves or fittings or for additional saw cuts required in areas damaged by the Contractor's operations. No additional payment shall be made for pavement removal by grinding for overlay. Payment for service line pavement removal shall be made only under the "Install Copper Service Pipe" bid item.

Trench Excavation

Payment of the contract price shall constitute full compensation for the furnishing of all labor, materials and equipment necessary to excavate and dispose of material from the trench excavation as well as abandoned facilities, complete and ready for installation of pipe as shown on the Drawings, required by the Specifications or as directed by the Engineer.

The number of cubic yards to be paid for under this item shall be calculated by the average end area method. The depth shall be the measurement from the bottom of pavement removed down to the limits of excavation as shown on the Drawings using nominal pipe diameter. The width shall be the neat line trench dimensions as shown on the Drawings or required by the Specifications. No allowance shall be made for extra width or depth at bell holes, valves or fittings. The length shall be the measured piping footage as determined in the pipeline bid items. Payment for service line trench excavation shall be made only under the "Install Copper Service Pipe" bid item.

For the purposes of this bid item, “conventional excavation” shall include any excavation using powered equipment in vehicular traffic areas. “Limited equipment excavation” shall include any excavation in vehicular traffic areas using powered equipment limited in size as indicated on the Drawings or in Section 01000 “Special Provisions” of these specifications. “Restricted equipment” excavation shall include excavation outside vehicular traffic areas where the Drawings, Specifications or terrain prohibit the use of motorized equipment.

Furnish and Place Imported Backfill - Select Sand

Payment of the contract price shall constitute full compensation for the furnishing of all labor, materials and equipment necessary to furnish and place sand and complete as shown on the Drawings, required by the Specifications or as directed by the Engineer.

The number of cubic yards to be paid for under this item shall calculated by the average end area method less the volume occupied by the pipeline and other installed structures therein. The width and depth shall be the neat line trench dimensions as shown on the Drawings, using nominal pipe diameter, with no allowance for extra width or depth at bell holes, valves or fittings. The length shall be the measured piping footage as determined in the pipeline bid items. Payment for service line trench backfill shall be made only under the “Install Copper Service Pipe” bid item.

All work necessary for the installation of trench dams of impervious import material shall be included in the bid price for Sand. The trench dam material shall be paid as an equal quantity of sand. No other calculation or payment shall be made for this work.

Furnish and Place Class 2 Aggregate Base Backfill

Payment of the contract price shall constitute full compensation for the furnishing of all labor, materials and equipment necessary to furnish and place Class 2 Aggregate Base and Recycled Class 2 Aggregate Base, compacted and complete and ready for surfacing as shown on the Drawings, required by the Specifications or as directed by the Engineer. No separate payment will be made for temporary or unsatisfactory material that is removed before final paving.

The number of cubic yards to be paid for under this item shall be calculated by the average end area method less the volume occupied by structures therein. The depth shall be measured from the top of the clean sand backfill up to the bottom of the permanent pavement section, as shown on the Drawings or measured during construction, with no extra depth for temporary fill removed prior to installation of permanent pavement. The width shall be the neat line trench width as shown on the Drawings, using nominal pipe diameter, with no allowance for extra width at bell holes, valves or fittings. The length shall be the measured piping footage as determined in the pipeline bid items. Payment for service line trench backfill shall be made only under the “Install Copper Service Pipe” bid item.

All material and work necessary to furnish and place Control Density Fill shall be included in the contract bid price for Class 2 Aggregate Base. Control Density Fill

material shall be paid as equal quantity of Class 2 Aggregate Base and no other calculation or payment measurement shall be made for this work.

All work necessary for the installation of trench dams of impervious import material shall be included in the bid price for Class 2 Aggregate Base. The trench dam material shall be paid as an equal quantity of Class 2 Aggregate Base. No other calculation or payment shall be made for this work.

Furnish and Place Permanent Pavement

Payment of the contract price shall constitute full compensation for the furnishing of all labor, materials and equipment necessary to remove and dispose temporary pavement and excess backfill materials, prepare the surface for permanent pavement, and furnish and place new permanent pavement surfaces complete for use as shown on the Drawings, required by the Specifications or as directed by the Engineer. This contract price shall also include but is not limited to the cost of furnishing and placing pothole restorations, sand seal and crack seal materials, expansion joints, street markings, and traffic control loops, as required by the Drawings, Specifications, or Encroachment Permits.

The number of square feet to be paid for under this item shall be calculated by the measurement of the neat line width of the paving section as shown on the Drawings using nominal pipe diameter. The length shall be the actual length of measured piping as determined in the pipeline bid items. No additional payment shall be made for the paving of pothole restorations, bell holes at joints, valves or fittings or of areas damaged by the construction project. Payment for service line permanent pavement shall be made only under the “Install Copper Service Pipe” bid item.

In the event that the Engineer requires an asphalt thickness other than that shown on the Drawings or listed in the Specifications, the pavement quantities measured shall be increased or decreased by the ratio of the actual thickness to the thickness originally required on the Drawings or Specifications.

Sheeting and Shoring

Payment of the contract price shall constitute full compensation for designing and providing all sheeting and shoring as required by Section 6707 of the Labor Code for the construction of all the preceding bid items, complete in place.

Payment will be made for sheeting and shoring based on the actual linear footage of trench sheeted or shored on the project.

Excavation and Disposal of Rock

Payment of the contact price shall constitute full compensation for supplying all labor, equipment and materials required to excavate rock, as required by the Specifications, or as directed by the Engineer. Rock is defined in Technical Specifications Section 2200.

The quantity to be paid under this item shall be the cubic yards of rock disposed of as calculated by the Engineer using the average end area method. The depth shall be

measured from the top of the rock cross section measured before rock excavation to either the bottom of rock excavation or three inches below the bottom of the pipe to be installed whichever is less. The width shall be the neat line trench width, as shown on the Drawings, using nominal pipe diameter, with no allowance for extra width at bell holes, valves or fittings. The length to be paid for shall be the length of rock in the trench measured before rock excavation. All work necessary to excavate and remove rock shall be included in the bid price.

Payment for this bid item shall be made in addition to payment for the bid item for trench excavation for areas where rock meeting the definition in these specifications occurs.

END OF SECTION

SECTION 02713

DISTRIBUTION PIPING SYSTEM

GENERAL

DESCRIPTION

This section includes specifications for materials, testing and installation of all piping, fittings, valves, and accessories as shown on the Drawings, described in the Specifications and as required to completely interconnect all existing and new piping for a complete and operating system. This section applies to all buried pressure water systems.

RELATED SECTIONS

Section 02200 - EARTHWORK

Section 02655 - CATHODIC PROTECTION

Section 09801 - FIELD APPLIED TAPE COATING SYSTEMS

REFERENCES

The standards of organizations listed below are cited and modified as noted within these specifications. Citations refer to the most recent publications of these organizations' standards.

American Water Works Association (AWWA)

American Society for Testing Materials (ASTM)

National Association of Corrosion Engineers (NACE)

American Welding Society (AWS)

NSF International

PRODUCTS

CONTRACT MATERIALS

Unless otherwise noted, the materials for work performed under this section will be supplied by the District. Temporary materials for flushing, disinfecting, hydrostatic testing and for keeping the existing piping in service until the new piping is in service shall be provided by the Contractor.

MATERIAL INFORMATION

The following material information is provided for the contractor:

Piping is stocked and issued in 20 foot lengths with bell & spigot joints

Welded steel pipe is mortar lined and tape or extrusion coated

Weld Ells (Elbows) are stocked and issued in 45 and 90 degree sections

EXECUTION

GENERAL

It is specifically brought to the Contractor's attention that the pipeline has not been designed as an "engineered" project. The Contractor is given latitude to modify the profile as best fits existing field conditions. As such, all fabrication shall be done in the field after the location of existing utilities has been determined. No extra payment will be made for changes in the design as a result of either shown or unshown utilities, structures or field conditions. It is incumbent upon the Contractor to expose all utilities and structures prior to commencement of the work on the project.

For pipe with diameter greater than 12 inch, transmission pipe, the intent of the layout shown on the plans is to minimize the changes in grade and the number of elbow fittings used. Grade conflicts with existing utilities are to be avoided by gradual change of grade in the pipeline.

HANDLING MATERIAL

The Contractor shall provide and use proper equipment and tools for the safe and convenient prosecution of the work. All pipe, fittings, and valves shall be carefully lowered into the trench in such manner as to prevent damage to surfaces, lining, coating, appurtenances or other parts necessary for the materials' usefulness. Any such damage shall be repaired by the Contractor at his own expense.

PIPE INSTALLATION

All of the pipe shall be thoroughly cleaned of all dirt, rock and other debris that may be found in the interior of the pipe. If considered necessary by the Engineer, he may direct the Contractor to swab the pipe to clean it. Prior to placement of the pipe, the Contractor shall repair any damage to the exterior coating.

Nothing herein shall preclude the method of assembling and welding the pipe in suitable sections above ground to reduce the number of below ground joints. If this method is adopted, the Contractor shall temporarily support the line on adequately sized and spaced timbers across the trench. The timbers shall have a minimum of one foot of bearing length on each side of the trench. Each support shall be padded to prevent any damage to the exterior coating of the pipe. When lifting and lowering multiple-pipe sections, the Contractor shall utilize the number of support locations and pieces of lifting equipment required by the Engineer.

Each joint of steel or steel cylinder pipe shall be lifted by means of belt-type slings approved by the Engineer. The slings are to provide support in order to prevent damage to the coating or undue, injurious deflection of the pipe while lowering it into the trench. When lifting and lowering other pipe types, the Contractor may utilize other means approved by the Engineer. In no case shall wire rope or chain be used for such purposes.

When lowering single lengths of pipe into the trench, each shall be lifted and held in two properly spaced locations and lowered in such manner as to prevent undue deflection. Such procedures shall be approved by the Engineer prior to assembly and installation.

The pipe shall be bedded and installed evenly so that the pipe barrel will be in full bearing for its entire length. After the trench has been excavated and prepared in accordance with these specifications, the pipe shall be carefully lowered into place and adjusted accurately to the required line and grade. Any blocking used to support the pipe during laying shall be removed after sufficient backfill has been placed to hold the pipe on the required line and grade and before laying the next section. Each pipe shall have a firm bearing for its full length in the trench.

Pipe shall be installed upgrade (low elevation to high elevation) and the bell end of the pipe shall be installed on the upgrade side unless otherwise authorized by the Engineer.

Change in the pipeline grade, slope or horizontal direction, which are in excess of that allowed within the pipe joint, shall be constructed from the fittings furnished. Weld ells shall be trimmed by the contractor to the angle necessary to accomplish the required change.

SEPARATION AND CLEARANCE

A minimum vertical clearance of six (6) inches shall be maintained between a water facility and any obstructions.

A minimum vertical clearance of twelve (12) inches shall be maintained between high pressure or transmission gas, electrical/ communication ducts and conduits.

The minimum vertical clearance and horizontal separation between water and sewer, recycled or storm drain facilities shall be in accordance with standards established by the State Department of Health Services and Title 22, Section 64572 of the California Administrative Code. The design guidelines of the Engineer are the following:

The horizontal separation between water and sewer mains shall attempt to maintain a distance of not less than 10-feet.

The horizontal separation between water mains and storm drain, recycled or raw water piping shall attempt to maintain a distance of not less than four (4) feet.

Where the water main must cross a sewer, storm drain, recycled water or raw water pipe, the crossing shall be made as close to a 45 degree angle as possible and the bottom of the water facility shall be as close to 12-inches above the top of the sewer pipe as possible. When the water main installation crosses any sewer, a minimum of eight (8) feet shall be maintained between the sewer and any pipe joint on the new water pipeline.

If these conditions cannot be met, variations will be allowed as determined by the Engineer.

PIPE JOINTING

General

The type of joint to be used normally will be indicated on the plans or in the specifications for this contract. If not designated, the type of joint may be any of those listed in the paragraphs below. The Contractor shall use care in making all joints, and shall strictly follow appropriate installation procedures as indicated by the manufacturer or as directed by the Engineer. In general, installation requirements for several, but not all joint types are as follows:

Welded Joints

For bell and spigot joints, the spigot must stab at least one half of the bell depth. District standard piping has a 2-inch bell. This "pull" dimension limits the deflection allowable in a welded joint.

All welding shall be done in accordance with American Welding Society Standards and "Field Welding of Steel Water Pipe", A.W.W.A. C206. Welders shall be qualified in accordance with Section 4.4 of the AWWA specification, and proof of certification may be required by the Engineer.

All welds shall be made with the electric arc process. All welding rods shall be furnished by the Contractor and shall be Lincoln Fleetwood 5P or equivalent as determined by the Engineer. All welding machines shall be equipped with a voltmeter and ammeter in good working condition. Continuous feed wire welding shall not be allowed for any field welding.

Tack welds shall have 100% penetration, and in the event that any tacks break, they shall be completely chipped out before circumferential welding is started.

Welds shall be made in two or more passes. The number of filler and finish beads shall be such that the completed weld shall have a substantially uniform

cross section around the entire circumference of the pipe. The entire root bead shall be made with the pipe in a stationary position and successive beads shall not be started at the same location. The crown of the finished weld shall not be raised above the parent metal by more than 1/16 of an inch. A maximum undercut of 1/32 of an inch may be permitted. Weld penetration shall be 100% and the thickness of weld shall be equal to or greater than the wall thickness of the pipe. Each bead shall be completely cleaned of all slag and extraneous materials with a pointed chipping hammer and a stiff wire brush after each pass. Welding shall not be performed when surfaces are wet or during periods of high winds unless the operator and work are properly protected.

Slag inclusion is permissible where it occurs between layers of the weld and is equal to not more than one-half the width of the weld metal measured in a direction parallel to the face of the weld and when its greatest dimension measured in a direction perpendicular to the face of the weld does not exceed 10% of the throat.

Gas pockets are permissible that do not exceed 1/16 of an inch in the greatest dimension and when there are no more than six gas pockets of this maximum size per square inch of the weld metal or where the combined areas of a greater number of pockets do not exceed 0.02 square inch per square inch (2% of weld metal).

Joints between plain ends shall be made using butt straps as specified by the Engineer. Butt welding between plain ends of pipe shall not be allowed.

The District may require weld radiographs of joints where necessary. Such radiographs will be interpreted by persons who are qualified through training and experience to perform this service. Should any welds not conform in quality to the minimum requirements, they shall be replaced by the Contractor at no cost to the District, and the Contractor will be charged the costs of obtaining and evaluating the radiographs. No charge will be made to the Contractor for radiographs of satisfactory welds.

Slip-on Joints

The slip-on type joint installation applies for several different types of pipe including ductile iron, cast iron (Tyton), polyvinylchloride (PVC), and asbestos cement (AC) pipe. In all cases, the Contractor shall follow the manufacturer's installation procedures. In general, the procedure for slip-on joints will be as follows:

1. All foreign matter shall be removed from the gasket, groove, and bell (or coupling). In addition, the spigot of the entering pipe must be clean for a minimum of 8-inches from the stab end.

2. The gasket shall be installed so that it is evenly seated in the groove within the bell (or coupling) and in accordance with the manufacturer's recommendations.

3. Approved lubricant shall be applied to the installed gasket, the bell (or coupling) interior, and the pipe spigot (from the taper end to a point outside the full insertion length). Lubricant shall not be applied to the groove. Any lubricants which are used to facilitate jointing shall conform to the American Water Works Association and NSF International standards for use in potable water systems

4. With the pipe sections in alignment and the pipe ends in contact, sufficient force shall be applied to the entering pipe so that the spigot is pushed through the gasket and against the back of the bell (or coupling). If an insertion mark is provided, it should be flush with the end of the coupling (or bell) upon completion of the joint.

5. If field cuts are required, all cuts will be squared to the Engineer's satisfaction and the spigot end beveled in accordance to the manufacturer's recommendations.

6. Maximum deflection at or between joints of full sticks (20 feet) of pipe shall be as allowed by the Engineer or manufacturer's specifications. For example, ductile iron pipe joint deflections may vary from five degrees for 4-inch pipe to three degrees for 12-inch pipe. However, the maximum deflection joint to joint shall be 1.0 foot. PVC is known to fail at service taps at the manufacturer's maximum allowable deflection.

Mechanical Joints

The mechanical type joint installation applies for several different types of pipe including ductile iron, cast iron (Tyton), polyvinylchloride (PVC), and asbestos cement (AC) pipe. In all cases, the Contractor shall follow the manufacturer's installation procedures. In general, the procedure for mechanical joints will be as follows:

1. All foreign material other than the standard coating shall be removed from the outside of the spigot and the inside of the bell in the area within 8 inches of the joint end. The follower gland shall then be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland.

2. The entire section of the pipe shall be pushed forward to seat the spigot end into the bell. The gasket shall then be pressed into place within the bell, being careful to insure that the gasket is evenly seated around the entire joint. Then the follower gland shall be moved along the pipe into

position for bolting. After bolt insertion and hand tightening, all nuts shall be tightened with a suitable (preferably torque-limiting) wrench. The torque for various sizes of bolts shall be as follows:

Range of Torque

Bolt Size (Inches)	(Ft. - lbs)
5/8	40 - 60
3/4	60 - 90
1	70 - 100
1-1/4	90 – 120

Care shall be taken in final tightening of nuts in order to produce an equal pressure on all parts of the gland.

3. Maximum joint deflections shall be those allowed by the Engineer or manufacturer's specifications. For example, deflections may vary from five degrees for 4-inch pipe to three degrees for 12-inch pipe.

Threaded Joints

The threaded type joint installation applies for several different types of pipe including galvanized threaded pipe and brass pipe. In all cases, the Contractor shall follow the manufacturer's installation procedures. In general, the procedure for threaded joints will be as follows:

1. All foreign material other than the standard coating shall be removed from the outside and the inside within 8 inches of the joint end. The pipe shall be jointed at threaded ends with a threaded coupling.

2. Where the pipe is cut and no threaded end exists, the contractor shall clean, prepare and thread the end of pipe to make the connection with the threaded coupling.

Installation of HDPE Fireline Spools

1. Install flat washers between the nuts and the back up ring.

2. The back up ring shall be moved along the pipe into position for bolting. After bolt insertion and hand tightening, all nuts shall be tightened with a suitable (preferably torque-limiting) wrench. The torque for various sizes of bolts shall be as follows:

Range of Torque

Bolt Size (Inches)	(Ft. - lbs)
5/8	60
3/4	100

3. Bolts shall be tightened in a cross pattern, first top, then bottom, then right, etc. Care shall be taken in final tightening of nuts in order to produce an equal pressure on all parts of the back up ring.

4. One hour after originally tightened to proper torque, all bolts shall be checked for proper torque value. Tighten all bolts to proper torque value.

5. The spool shall be backfilled with well consolidated sand and Class 2 road base to provide support to the spool piece.

Installation of Flexible Couplings, Flanged Coupling Adapters and Joint Harnesses

1. Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Take care that the gaskets are wiped clean before they are installed. If necessary, gaskets may be lubricated with soapy water before installation on the pipe ends.

2. Connections to be made by the use of flexible couplings, or flanged coupling adapters shall have the follower ring, gasket and coupling barrel (middle ring) placed over the end of the pipe section already in place (in the trench, etc.). The other follower ring and gasket shall be placed on the next pipe to be joined. The pipe shall then be lowered as close as possible to the coupling barrel and shoved into position until there is approximately one-half inch space between the pipe ends and the coupling is centered over the space.

   Tighten bolts progressively, drawing up bolt on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall be equipped with torque-limiting wrenches or other favorably reviewed type.

Joint harnesses

Provide joint harnesses (tie rod lug or attachment plate assemblies) across all flexible couplings and flanged coupling adapters, except where specifically indicated otherwise on the Drawings. Harnesses welded to pipe sections shall be done prior to applying protective coatings. For flanged coupling adapters, anchor studs may be substituted for the harnesses on pipe up to 12-inch. Design restraint for 1 ½ times the test pressure of the applicable service or 225 psi, whichever is greater. As a minimum, conform to Tie Rod Table in AWWA..

COATING AND LINING

General

As with all construction, the Contractor shall strictly conform to all safety regulations issued by CAL/OSHA's Division of Industrial Safety and take all precautions indicated by the material manufacturers whose products are used on the job. In particular, whenever his men or the inspector(s) are inside the pipe, the Contractor shall use caution and shall do the following:

Provide adequate ventilation, lighting and communication.

Prevent waterflow in the pipe.

Insure that all valves are in the open position and are not operated until the pipe is vacated.

Remove all extraneous material that may cause future damage or contamination to the pipe interior.

Coating

1. The Contractor shall follow the manufacturer's recommendations when coating the exterior joints of concrete cylinder pipe or other similar pipe.

2. All metallic surfaces on pipe, fittings, services or appurtenances (including existing pipes that are uncovered under this contract) which will be buried and which do not have a protective coating shall be cleaned and wrapped with tape in accordance with Section 09801.

3. Prior to application of any specified tape, all bare metal and adjacent sound coating shall be thoroughly dried and cleaned by wire brushing, solvent cleaning, sandblasting, or other means as will be determined by the Engineer, to insure adequate bond of the field applied coating. Primer shall be applied by brush to all bare metal and adjacent surfaces and allowed to set according to the manufacturer's instructions.

4. All service tubing shall be cleaned to bright metal, free of contamination and moisture. The service pipe will be primed and PVC tape shall be spirally applied using two-inch wide tape with a minimum of one-half inch overlap. Sufficient tension shall be used so that there are no wrinkles. The tape will be a 10-mil PVC tape carrying UPC approval.

5. Steel pipe surfaces including pipe joints, damaged shop applied pipe coating, hydrant buries, valves and other fittings with less than 20 mils thickness shall be cleaned of all dirt, moisture, oil or other contamination and primed and tape wrapped. The pipe shall be circumferentially

wrapped with enough tension to stretch the tape. The tape shall be overlapped at least 25%. No wrinkles or other voids will be permitted.

6. All exposed metal piping shall be primed and coated with the same system as adjacent pipe. Application shall be the same as for steel pipe. Surface preparation and application of prime and tape coatings shall be done by workers trained in this procedure. Demonstration of this training may be required. All field-applied coating shall be inspected and tested before backfilling.

Lining

1. Small Diameter Pipe: For pipe having an inside diameter of less than 22 inches, a dry mixed cement mortar with sufficient moisture for workability shall be placed as a fillet at the face of the cement lining and around the entire circumference of the bell prior to inserting the spigot into the bell. Immediately thereafter, an inflated ball of a diameter slightly larger than the inside diameter of the pipe shall be pulled past the mortared joint to remove any fins or mortar extruding into the pipe barrel. After the inflated ball has been disturbed past the joint recess, the adjoining pipe sections shall not be disturbed. Once the inflated ball has been pulled through the pipe, the joints can be welded together.

2. Large Diameter Pipe: For pipe having a nominal inside diameter of greater than 22 inches, a dry mixed cement mortar with sufficient moisture for workability shall be hand placed around the entire circumference of the joint after completion of the joint weld. The Contractor shall provide, at his expense, video inspection of the entire completed interior of the pipeline. The Contractor shall notify the District at least 48 hours in advance of the inspection. It is incumbent on the Contractor to provide clear and visible video inspection of the pipeline. The Contractor shall deliver one copy of the videotape to the District upon completion of the video inspection. Water shall not be placed in the pipeline until after the District approves the video inspection. Areas not mortared to the satisfaction of the Engineer shall be repaired and video inspection shall be repeated.

INSTALLATION OF APPURTENANCES

General

Appurtenances shall be installed on the pipeline by the Contractor at the locations shown on the Drawings, or as directed by the Engineer. The details of the installations as shown on the Drawings, or described in the Specifications are

typical only, and final installations may have to be varied to meet field conditions at the time of installation.

Fittings

Joints between pipe and fittings shall be made in a manner similar to the method followed in joining the main sections of pipe. The trench bottom shall be graded uniformly so that no torsional strain will be placed upon fittings or connecting devices when backfill is placed. Proper thrust restraint shall be installed.

Valves

Valves are to be installed by the Contractor in the locations shown on the drawings and as directed by the Engineer. All valves shall be set with valve stems in a vertical plane (+ 1%) parallel to the line of the pipe. Unless otherwise directed by the Engineer, all valves shall be fully supported on 2" x 12" redwood blocking which rests firmly on undisturbed ground. Butterfly valves shall be installed such that offset underground operators are northerly or easterly of the line of pipe. The Contractor will be required to install operating nut extensions for all butterfly valves and for any valve where the operating nut will be four feet or more below finished grade. The installation shall be made after final grade is established and such that the top of the extension is a maximum of 12-inches below final grade.

Electrical Continuity at Valves and Hydrant Buries

Electrical continuity shall be preserved across valves, hydrant buries, and any other epoxy-coated flanges where no flange insulating kits are indicated. The Contractor shall grind each epoxy-coated flange at one bolt hole to remove sufficient epoxy coating to assure that the bolt head and nut seat on bare metal.

Valve Tubing, CTS Tubing, and Gate Caps

In general, valve and corrosion test station (CTS) tubing shall be installed to existing grade and raised continuously until final pavement is complete or as directed by the Engineer. The tubing shall be installed perpendicular to the main such that the operating nut, extension or terminal block is centered in the tubing. The tubing shall be primed and wrapped. A gate cap shall cover the tubing at all times after installation. The Contractor shall, at his own expense, clean or replace any valve caps which are not in the same condition as when issued. In addition, an asphalt ring shall be placed around the top of the valve tubing to the Engineer's satisfaction. Normally the asphalt ring shall extend 12 inches outside the tubing and be placed with a thickness of four inches.

Blowoffs

Blowoffs are to be installed by the Contractor in accordance with the typical details shown on the Standard Drawings. The Contractor shall perform all cutting, fitting and threading necessary to fabricate the blowoff and connect it to the pipe.

Pressure Regulating Stations

Pressure regulating stations are to be installed by the contractor at locations shown on the Drawings or as directed by the Engineer. The regulating stations shall be constructed such that all appurtenances are fully accessible and can be freely maintained and operated. Pits and blocking shall be set on native soil or Class II aggregate base. The Contractor shall perform any cutting, fitting and threading necessary to fabricate the pressure regulating system and connect it to the pipe.

Marker Posts

In unpaved areas, District-furnished marker posts indicating mainline, drain, blowoff and air valves, easements or other facilities shall be installed as shown on Drawings or as directed by the Engineer.

HYDRANT INSTALLATION

Hydrants of the type indicated on the plan shall be installed by the Contractor in the number and the locations indicated on the drawings or as directed by the controlling Fire Chief, or Engineer. All hydrants shall be accurately set (+ 1% vertical) and leveled at the proper elevation as indicated by the local fire jurisdiction above the finished grade. Hydrants shall be suitably blocked with concrete thrust blocks. Hydrant details and their relationship to the curb and/or sidewalk are shown on the Standard Drawings.

New hydrant bodies are to be received by the contractor at the offices of the appropriate Fire Department and transported to the site.

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. Existing hydrant bodies shall be returned to the governing fire department.

Hydrant Bollards shall be installed as shown on the plans and detailed in the Standard Drawings. The material shall be provided by the District (pipe) except as noted otherwise (concrete and coatings.)

SERVICE LATERALS

Service laterals may be installed using either open cut or trenchless techniques, as described in Section 02200.

All new mainline taps for service transfer installations shall be located within one-foot of where the existing service line crosses the new mainline or the shortest distance to intercept the existing service line.

All new mainline taps for service renewal installations shall be located on the new mainline perpendicular to the meter or the shortest distance to intercept the existing meter.

All services are to be copper runs completely. Typical service transfer shall be used when existing service piping is copper. If service piping is any material other than copper, replace the service piping complete to the meter box. Service piping shall be installed, as shown on Drawings, as required by the Specification or directed by the Engineer.

Service piping shall be installed in a single piece of pipe from meter to main whenever possible. Joints on the service piping shall be minimized.

All existing copper services shall be insulated at the meter, as shown on the plans, unless already insulated.

When installing services on PVC pipe, tapping shall be done with an approved cutting tool. The tool shall be an internal tooth shell cutter or other designed cutter, which will retain the coupon and accommodate the heavy wall of PVC class water pipe.

Service connections shown as " connect service by hot tap" on the Drawings shall be made by Contractor. Contractor shall provide approved tapping machine, demonstrate that the machine is disinfected with all necessary equipment to complete the "hot tap" connection. The machine shall be an internal tooth shell cutter or other designed cutter, which will retain the coupon.

Particular care shall be taken in the backfilling and compaction of the area around the taps to the main. Hand tamping will be required rather than equipment tamping or rolling.

Where the water service must cross the sewer line, the bottom of the water service, within 10 feet of the point of crossing, shall be at least 12 inches above the top of the sewer.

Prior to installing a service lateral using a punch tool trenchless technique, the Contractor shall locate and ascertain the depth of all conflicting utilities. The Contractor shall clearly mark the depth and location of conflicting utilities. For sanitary sewer and

storm drain facilities, the Contractor may utilize exiting evidence of depth, such as manholes. For all other utilities, the Contractor shall use a pipe locator with a depth indicator. The Contractor shall be responsible for installing the service without damaging any other utilities.

The Contractor shall use care to not damage any concrete curb, gutter and sidewalk in the installation of service piping and meter connections. Any damage shall be repaired or replaced, to the local jurisdiction's satisfaction at the contractor's cost.

PLUGGING OF ENDS OF PIPE

At the end of each day's work or when pipe is not being installed, the end or ends of the pipe shall be securely sealed in such a manner as to prevent the entrance of any foreign material including water into the interior of the pipe.

FABRICATION OF FIELD MITERS

Steel Pipe

1. Unless otherwise specified, welded fittings shall be used at points of change of direction on steel pipe. Welding of fittings shall conform to the requirements of AWS B36.10.

2. When fabricated fittings are permitted for alignment changes, the Contractor will be required to cut, fit and reweld the pipe to form the required bend. Bends shall be made with one miter for each 22-1/2 degrees or fraction thereof. In general, miters are to be formed by cutting a straight length of pipe at an angle equal to one-half the total angle required and then rotating one section 180^{o} and rewelding so that the total desired miter is obtained. Trimming and fitting that may be required to prepare the two pieces of pipe for rewelding is to be done at the expense of the Contractor. Miters may be cut by hand or machine at the option of the Contractor. All wrap, welding, repair to interior coating and exterior coating, shall be done in accordance with the requirements previously set forth for pipe jointing, coating and lining.

INSTALLATION OF INSULATING JOINTS, TEST STATIONS, AND BONDING JUMPERS FOR JOINTS

As indicated on the Drawings, insulating joints shall be installed to electrically isolate sections of the pipeline. Insulating joints shall consist of plastic sleeves, washers and gaskets in flanged joints or sections of non-metallic pipe.

Care shall be exercised to correctly install all parts in flange insulating kits, to prevent reducing the dielectric properties by bridging across the interior of the pipeline with cement mortar lining, and to properly coat the exterior metal after fabrication and testing.

The Contractor shall give notification at least one day in advance so that the Engineer can be on hand to test insulating joints during and after fabrication and check test lead connections before protective coatings are applied.

The Contractor shall be responsible for the electrical continuity of all pipe and fittings, and the discontinuity of insulating joints. In the event that insulating joints become shorted or test lead wires or bonding jumpers become disconnected during work or within the maintenance bond period, it will be the responsibility of the Contractor to make all repairs at his expense. Loss of the insulating qualities or broken wires from any cause (other than defective materials furnished by the District) shall be repaired at the Contractor's expense, regardless of any prior approval given by the Engineer. Electrical shorts or discontinuities shall be determined by voltage and current measurements in conjunction with audio frequency signals or other means, and shall be considered detrimental when of a magnitude to jeopardize the application of cathodic protection as established by the Standards.

See also Section 02655 Cathodic Protection for further requirements.

INSTALLATION OF THRUST BLOCKS

All pipe fittings which are not otherwise adequately restrained shall be blocked against the undisturbed soil on the sides of the trench by means of concrete thrust blocks or by gravity anchor blocks in the case of vertical bends, in accordance with the typical details shown on the drawings. It shall be the Contractor's responsibility to adequately restrain all permanent and temporary fittings at all times.

DIG-IN PROTECTION WARNING TAPE

Dig-in protection warning tape shall be installed in accordance with Section 02645 when pipe is installed in unpaved areas.

HYDROSTATIC PRESSURE AND LEAKAGE TESTING

GENERAL

Hydrostatic tests shall be performed on all pipe installed in this project. Contractor shall furnish all equipment, material, personnel, and supplies to perform the tests and shall make all taps and other necessary temporary connections. The Contractor must use an approved, properly functioning, double-check valve backflow prevention assembly when loading the line for testing. Test pressure shall be measured at the lowest point on the line unless specifically noted otherwise. Hydrostatic tests shall be performed on all piping at a time agreed upon and in the presence of the Engineer.

The hydrostatic test for buried piping shall be made after all pipe is installed and backfilled. However, the Contractor may conduct preliminary tests prior to

backfill. If the Contractor elects to conduct preliminary tests, he shall provide any necessary temporary thrust restraint. In no case will final testing be done prior to acceptance of backfill compaction.

The hydrostatic test for encased piping shall be made after all pipe is installed and encased. However, the Contractor may conduct preliminary tests prior to encasement. If the Contractor elects to conduct preliminary tests, he shall provide any necessary temporary thrust restraint.

Whenever curb cocks are to be installed, they shall be installed to final grade and included in the facilities tested.

All supports, anchors, and blocks shall be installed prior to the hydrostatic test. No temporary supports or blocking shall be installed for final test.

It shall be the responsibility of the Contractor to block off or remove equipment (valves, gauges, etc.) which are not designed to withstand the full test pressure.

The Contractor shall provide pipe taps, nozzles and connections as necessary in piping to permit testing including valves to isolate the new system, filling the lines, purging air, draining the lines and disposal of water, as is necessary. These openings shall be plugged in a manner favorably reviewed by the Engineer after use. The Contractor shall provide all required temporary bulkheads and thrust restraints.

If leakage exceeds the allowable for gasketed joint pipe, the installation shall be repaired or replaced and leakage tests shall be repeated as necessary until conformance to the hydrostatic test requirements specified herein have been fulfilled. All visible leaks shall be repaired even if the pipeline does not exceed the allowable leakage rate.

The Contractor shall submit all test reports to the Engineer and keep records of each piping test, including:

a. Description and identification of piping tested.

b. Test Pressure

c. Date of Test

d. Witnessing by Contractor and Engineer

e. Test Evaluation

f. Remarks, including such items as leaks (type, location) and repairs made on leaks

When not shown on the Drawings, the Contractor shall install valved outlets at high points on piping to permit venting of air. Valves shall be capped after testing is completed.

TEST PROCEDURE

1. Schedule. As soon as is practicable after any section of pipeline has been completed, including acceptance of backfill compaction results, and when directed by the Engineer, that section of pipeline shall be subjected to a hydrostatic pressure and leakage test.

2. Initial Filling. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the mortar lining to absorb what water it will and to allow the escape of air from any air pockets.

3. Test Section. The Contractor shall not test a section of pipeline greater than 1000 feet in length nor an elevation difference of greater than 100 feet, without the Engineer's approval.

4. Test Pressure. Unless otherwise specified, the test pressure shall be 200 pounds per square inch or fifty (50) percent above static line pressure at the lowest point of the test section, whichever is greater.

5. Duration and Conditions of Test. After the initial hydrostatic pressure is applied to the section to be tested, it must remain unaided within 10 P.S.I. of the initial pressure for a duration of two hours for distribution pipelines and four hours for transmission pipelines 24-inches in diameter and larger. If the pressure drops below this limit, the section being tested will be considered defective. The Contractor shall determine the cause of failure and make necessary repairs. The test shall be repeated until the Engineer is satisfied that leakage requirements have been met and the line is actually ready for use. The Engineer may require that valves be closed to isolate sections of piping for testing as individual mains. The Contractor shall not be entitled to additional payment for any work associated with additional testing required by the Engineer as a result of failed tests, or work required to isolate failure locations.

6. Leakage Measurement. After the pressure test and if any pressure drop has occurred, the Contractor shall determine the leakage volume. This shall be achieved by injecting water from a calibrated container into the pipeline via a pressure pump until the pressure again reaches the initial applied pressure. The amount of water injected is the leakage volume.

7. Welded Steel Pipe Leakage. There shall be no leakage allowed for welded steel pipe installations.

8. Rubber-Gasket Joint Pipe Leakage. If the Contractor cannot determine the point(s) of leakage by thorough physical examination performed to the satisfaction of the Engineer, the pipeline will be considered acceptable if the amount of leakage is less than that determined by the following formula:

$$L = \frac{ND\,(T)1/2}{14800}$$ where

L = leakage in gallons per hour
N = total number of gaskets
D = nominal pipe diameter in inches
T = test pressure in psi

FLUSHING AND DISINFECTION

FLUSHING

1. After successful pressure and leakage testing, the Contractor shall thoroughly flush the pipeline and appurtenances prior to chlorine application. The flushing velocity shall be a minimum of 3 feet per second unless the Engineer determines that field conditions will not permit the required flow to be discharged to waste. The flow rates required to produce the minimum acceptable velocity are shown below.

REQUIRED OPENINGS TO FLUSH PIPELINES*

(40-psi Drop in System Pressure)

Pipe Size (Inches)	Flow Required to Produce 3.0 fps Velocity (gpm)	Temporary Plug/Tap Size (Inches)	Hydrant Outlet Number	Nozzles Size (Inches)
4	120	2	1	2-1/2
6	260	2	1	2-1/2
8	470	2	1	2-1/2
10	730	4	1	2-1/2
12	1,060	4	1	2-1/2
14	1,440	4	2	2-1/2
16	1,880	4	2	2-1/2
18	2,380	5	2	2-1/2

*With 40 psi drop in system pressure, a 2-1/2 inch hydrant outlet nozzle will discharge approximately 1,000 gpm, and a 4-1/2 inch hydrant nozzle will discharge approximately 2,500 gpm.

Flushing shall be accomplished through an opening furthest from the point of entry of the flushing flow. The entire system however, shall be flushed including hydrants, laterals and blowoffs. The Contractor is responsible to ensure flushing operations comply with the NPDES Permit for Drinking Water System Discharges and shall be required to provide for and document de-chlorination of flushing water as it is being discharged.

Flushing shall be continued as long as the discharged water appears turbid to the Engineer. Flushing shall allow at least two exchanges of the volume of the water in the pipeline unless otherwise determined by the Engineer.

If necessary, the Contractor shall provide temporary piping to divert flushing water to natural drainage in order to prevent erosion or nuisance.

DISINFECTION

1. Submittals:

   A. The Contractor shall provide the District a list of all chemicals that will be used for the pipeline disinfection process along with Safety Data Sheets (SDS) for approval, prior to scheduling pipeline disinfection.

2. In general, the following constitutes the District's requirements for disinfection:

   a. After flushing, the Contractor shall disinfect the newly constructed facilities in accordance with the AWWA Standard C651-14 (or most recent version) Continuous feed method. The Contractor shall provide to the Engineer a plan detailing the lengths, diameters of the proposed pipeline disinfection sections prior to scheduling disinfection.

   b. The Contractor or the Contractors disinfection sub-contractor shall have a minimum of 5 years of experience providing pipeline disinfection services for water agencies or municipalities. **Please supply three references that can be contacted to verify performance**.

   c. The Contractor shall furnish all labor and material to complete the disinfection operation. All equipment required to disinfect the pipeline including, hoses, flushing standpipes, backflow devices, flow metering devices, diffusers shall be in proper working condition and shall be ANSI/NSF 61 compliant.

   d. The continuous-feed method consists of filling the main to remove the air pockets and then dosing chlorine continuously to obtain a concentration of not less than 25 mg/L free chlorine throughout the

main. The contractor shall take and document a chlorine residual measurement at the end of all branches and in at least 3 locations in the main section of the pipeline to verify that the entire pipeline has the desired level of chlorine. The chlorinated water in all portions of the main shall have a residual of not less than 10 mg/L of free chlorine after the 24-hr period. **All supporting documentation and calculations used by the Contractor to determine the required chlorine, water, total solution, injection and flow rate shall be provided to the District prior to starting the disinfection process to verify disinfection time and final chlorine concentration.**

e. All hydrants, service piping or other appurtenances, are subject to controlled flow insuring introduction of chlorine solution into all sections of the new facility.

f. A copy of the discharge permit shall be provided to the District and a copy shall be available onsite during the flushing process.

g. Following the chlorine contact period flush the highly chlorinated water from the main fittings, valves and branches until the chlorine residual that is measured is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use. The highly chlorinated water shall be de-chlorinated and meet the Regional Water Quality Control Board's requirements for planned and unplanned discharge of potable water.

h. The Contractor shall sample the pipeline post disinfection and measure the chlorine residual 24 hours after disinfection to ensure that not less than 10mg/L and report back to the District. If chlorine residual is found to be less than 10mg/L, the disinfection shall be considered unacceptable and the pipeline section shall be re-disinfected until the 10mg/L residual it measured.

i. Bacteriological sampling and testing shall be requested by the Contractor and shall be performed by District Water Quality Field Technicians. Samples shall only be collected **Monday-Thursday**.

j. Two consecutive passing tests, with sampling separated by 24 hours, are required. District staff will determine if the disinfection process has been successful. In the event that it has failed, the disinfection process shall be repeated by the contractor at no cost to the District.

k. The Contractor shall be required to maintain a minimum of 20 psi line pressure in the disinfected pipe throughout the bacteriological sampling process. The Contractor shall also provide ¾ inch non-threaded hose bibs at each sampling location a minimum of 12-inches above grade.

l. Typical time necessary for passing the bacterial testing process is a minimum five (5) business days; that is, 24 hour chlorination 24 hour chlorine contact time 24 hour flushing and sampling, 24 hour second sampling, 24 hour results. The Contractor shall schedule his work with this consideration.

m. The chlorinating and flushing shall be done through an approved, properly functioning, double check valve backflow prevention assembly to prevent backflow.

3. The chlorinated water shall remain in the pipe for at least 24 hours unless otherwise directed by the Engineer. At no time shall the chlorinated water be allowed to flow into an existing water system.

4. While analysis of the samples is being conducted, the pipeline shall remain isolated and a positive pressure must be maintained in the new line until the time of actual connection to the existing system. In order to insure this, the Contractor shall, at his expense, provide and install a temporary pressure gauge and/or temporary piping with an approved, properly functioning, double check valve backflow prevention assembly or approved backflow prevention device as directed by the Engineer. This gauge shall be periodically checked, and if positive pressure is not maintained, additional bacteriological testing may be required.

5. After it is determined that the pipeline is free from bacteriological contamination, all temporary piping shall be dismantled and the connections to the existing pipeline shall be made.

MAKING CONNECTIONS TO EXISTING SYSTEM

Connections to the existing system shall be made by the Contractor at the points indicated on the Drawings or as directed by the Engineer. It shall be the Contractor's responsibility to adequately restrain all fittings at all times.

The Contractor shall be responsible for maintaining service in the existing piping system until that piping is abandoned. Temporary fittings and thrust blocks shall be installed on the existing piping wherever the pipe is cut and remains in temporary service but is not connected to the new system.

The Contractor shall be responsible for dewatering the tie-in area of all waters released from the piping as a result of the cutting of the main for making the connection.

The Contractor is warned that the existing piping may be other than standard size. Prior to scheduling a connection, he shall expose the existing pipelines at the point of connection to verify the actual pipe size and required couplings and fittings for connections.

When connecting to the rough barrel of an Asbestos Cement (AC) Pipe, the Contractor shall measure the outside diameter of the rough barrel on the existing AC. The Contractor shall report the dimension to the Engineer prior to pressure testing new mains or scheduling a shutdown for connection to the existing piping. The Contractor shall conform to all regulatory requirements, including applicable requirements of Federal OSHA Title 29 and California State OSHA, for the handling of AC pipe.

Connections shown as "hot taps" on the Drawings shall be made with the assistance of District forces. Upon contractor completion of the tapping valve installation, the contractor shall prepare the site for the District installation of the "hot tap." The District shall provide the tapping machine and one technician. The contractor shall provide the necessary air compressor, lift equipment and all other assistance required.

Since connections will result in temporary interruption of service in the area, it will be essential for the District to give at least two working days of advance notice to the affected consumers. Therefore, the Contractor shall notify the Engineer a minimum of four working days prior to making any connection that will necessitate shutdown of any water main currently in operation. The Contractor shall coordinate his scheduling of connections with District 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.

Connections shall only be made on **Tuesday through Thursday** and only if weather permits as determined by the Engineer. For customer service considerations, the District elects not to notify consumers on Friday for a shutdown of water service on the following Monday. Therefore, Monday notifications mean that the first opportunity for connection or shutdown in a week is Tuesday.

The contractor shall plan his work in consideration of the time constraints inherent in the testing and notification process described above.

When requested by the Engineer, the Contractor shall provide such assistance as may be required in notifying consumers of water service interruption.

ABANDONING EXISTING PIPELINES

All piping to be abandoned, as shown on the plans, is abandoned only when the pipe has been taken out of service, physically disconnected from the active water system, and has been sealed by the Contractor.

The contractor shall seal all cut ends of the existing piping that are not connected to the new system by either installing temporary fittings on the existing piping or by plugging the cut end with concrete extending two pipe diameters into the pipe.

After the concrete placement, the pipe end shall be blocked with a 2-inch thick redwood block.

END OF SECTION

SECTION 09801

FIELD APPLIED TAPE COATING SYSTEMS

GENERAL

DESCRIPTION

This specification covers tape systems for corrosion protection for metal pipe, tubing, valves, tie rods, fittings, and other metal surfaces in buried service. This includes protection for new unprotected metal surfaces, transition from new unprotected to existing protected surfaces, and repairs to damaged protective systems. The system shall be specifically designed to provide permanent protection from corrosion for metal piping and shall be suitable for application over coal tar, asphalt, polyethylene and epoxy surfaces. It shall also be suitable for atmospheric exposure without thermal blistering or ultraviolet degradation.

RELATED SECTIONS

Section 01300 – CONSTRUCTION SUBMITTALS

Section 02200 – EARTHWORK

Section 02713 – DISTRIBUTION PIPING SYSTEM

PRODUCTS

Tape products described in this section will be provided by the District.

EXECUTION

GENERAL

All metal pipe, tubing, fittings, appurtenances, tie rods and other metal surfaces used for buried service shall be cleaned of all dirt, moisture, oil or other contamination in preparation for tape wrapping.

SMALL DIAMETER PIPE AND FITTINGS

Small diameter pipe (less than 2” in diameter) and miscellaneous small diameter surfaces shall be wrapped with PVC TAPE. Metal surfaces shall be cleaned to bright metal, free of contamination and moisture. PVC tape shall be spirally applied using two-inch wide tape with a minimum of one-half inch overlap. Sufficient tension shall be used so that there are no wrinkles.

LARGE DIAMETER PIPE AND FITTINGS

All large diameter piping (2” and above) shall be tape wrapped using a MULTIPOLYMER 30 MIL TAPE SYSTEM. The surface shall be circumferentially wrapped with enough tension to stretch the tape. The tape shall be overlapped at least 25%. No wrinkles or other voids will be permitted.

REPAIRS TO DAMAGED SHOP APPLIED COATINGS

Steel pipe surfaces including pipe joints, damaged shop applied pipe coating, hydrant buries, valves and other fittings with less than 20 mils thickness shall be cleaned of all dirt, moisture, oil or other contamination and primed and tape wrapped using a MULTIPOLYMER 30 MIL TAPE SYSTEM.

WORKMANSHIP

Surface preparation and application of primer and tape coatings shall be done in accordance with the manufacturer’s recommendation.

INSPECTION

All field-applied coating shall be inspected and tested before backfilling.

END OF SECTION