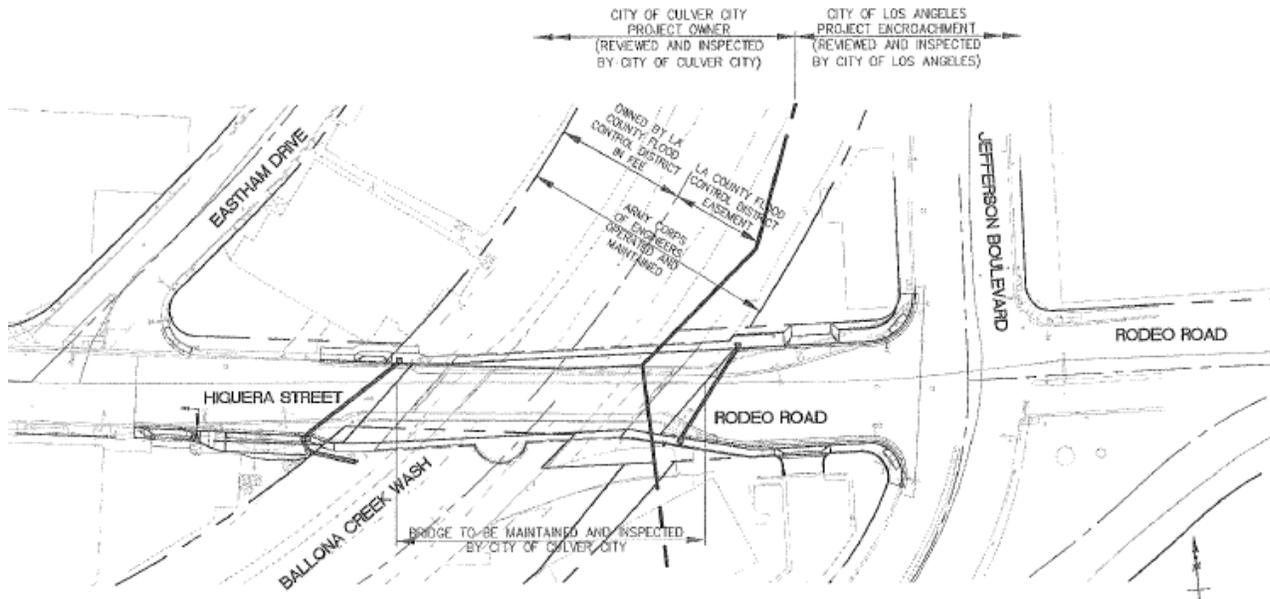


Final 100% SPECIAL PROVISIONS



HIGUERA STREET BRIDGE OVER BALLONA CREEK BRIDGE REPLACEMENT PROJECT

Federal Project Number BHLS-5240 (026)

PREPARED BY: IDC Consulting Engineers, Inc.

PREPARED FOR: City of Culver City

CITY OF CULVER CITY
Higuera Bridge Replacement
BID SCHEDULE

PSOMAS

Preparer(s): Vincent Hellens

Project No.: P553

Reviewer: Arief Naftali

Date Reviewed: 7/17/2019

Date Revised:

Bid Items	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization/Demobilization (Not to Exceed 5% of Subtotal)	1	LS		
2	Temporay Traffic Control	1	LS		
3	Changeable Message Signs	5	EA		
4	Remove and Construct Type C Integral Curb and Gutter (a=2' b=6" or as shown on plan and profile)	550	LF		
5	Remove and Construct Concrete (t=8", type=520-A-2500)	3	CY		
6	Remove and Construct Concrete Driveway (Case 2, W Per Plan)	1,560	SF		
7	Remove and Construct PCC Sidewalk	3,260	SF		
8	Remove and Construct Curb Ramp (Case Per Plans)	5	EA		
9	Remove and Construct Asphalt Concrete Pavement (t=5")	145	TON		
10	Remove and Construct Crushed Miscellaneous Base (t=8")	215	TON		
11	Remove and Construct Metal Beam Guardrail	25	LF		
12	Furnish and delivery of tree wells replacement	4	EA		
13	Remove Tree Well	4	EA		
14	Coldplane (Mill) AC Pavement (t=2" Min)	20,000	SF		
15	Remove and Construct Curb Drain per SPPWC Std Plan 150-3 (d=4" CIP)	10	LF		
16	Remove Existing Grate Inlet	1	EA		
17	Variable Depth Asphalt Concrete Pavement (t=2" Min)	250	TON		
18	Unclassified Excavation	110	CY		
19	Miscellaneous Grading	1	LS		
20	Remove and Construct Chain Link Fence	210	LF		
21	Remove and Construct Retaining Curb	390	LF		
22	Remove and Construct 18-inch RCP, 2000D, Case 1 Bedding	180	LF		
23	Remove and Construct 24-inch RCP, 2000D, Case 1 Bedding	50	LF		
24	Remove and Construct Side Opening Catch Basin (W=3.5')	4	EA		
25	Modify existing Junction Structure and install new 18" RCP per plan.	1	EA		
26	Construct Concrete Collar	1	EA		
27	Construct Warped Gutter/Local Depression at Catch Basin	3	CY		
28	Construct Brick and Mortar Plug	1	EA		
29	Class I Bike Path (2" AC/ 2" CMB)	650	SF		
30	Adjust Manholes to Grade	4	EA		
31	Adjust Valves to Grade	2	EA		
32	Traffic signal modification at Jefferson/Rodeo	1	LS		
33	Traffic signal modification at Higuera/Eastham	1	LS		
34	Remove, install and relocate Street lighting per plan	1	LS		
35	Modify Signing , striping and legend and pavement markings	1	LS		

CITY ENGINEER'S ESTIMATE

Culver City - Public Works

HIGUERA STREET BRIDGE REPLACEMENT (BRIDGE NO. 57-0781)

Date: July 2019

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	ITEM TOTAL
Structural Items - Bridge (IDC)					
19 2003	F STRUCTURE EXCAVATION (BRIDGE)	CY	1,050		
19 2037	F STRUCTURE EXCAVATION (RETAINING WALLS)	CY	408		
19 3003	F STRUCTURE BACKFILL (BRIDGE)	CY	567		
19 3013	F STRUCTURE BACKFILL (RETAINING WALLS)	CY	278		
49 0603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING (BRIDGE)	LF	3,317		
49 0603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING (RETAINING WALL)	LF	423		
50 0010	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	1		
51 0051	F STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	216		
51 0053	F STRUCTURAL CONCRETE, BRIDGE	CY	1,258		
52 0102	BAR REINFORCING STEEL (BRIDGE)	LB	463,234		
51 0054	F STRUCTURAL CONCRETE, BRIDGE (POLYMER FIBER)	CY	347		
51 0060	F STRUCTURAL CONCRETE, RETAINING WALL	CY	92		
52 0103	BAR REINFORCING STEEL (RETAINING WALL)	LB	12,684		
51 0086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	233		
51 9091	JOINT SEAL (MR 1 1/2")	LF	194		
60 0017	REMOVE RETAINING WALL	LF	100		
60 0097	BRIDGE REMOVAL	LS	1		
72 1810	SLOPE PAVING (CONCRETE)	CY	65		
75 0501	MISCELLANEOUS METAL (BRIDGE)	LB	577		
68 1132	GEOCOMPOSITE DRAIN	SQFT	4,470		
68 1103	3" PLASTIC PIPE (EDGE DRAIN)	LF	684		
68 0405	8" PERFORATED STEEL PIPE UNDERDRAIN (.064" THICK)	LF	45		
69 0105	8" CORRUGATED STEEL PIPE DOWNDRAIN (.064" THICK)	LF	140		
20 8818	6" WELDED STEEL PIPE CONDUIT	LF	442		
75 0505	BRIDGE DECK DRAINAGE SYSTEM (TYPE D-1)	LB	2,328		
83 3088	F TUBULAR HANDRAILING	LF	508		
83 9719	F CONCRETE BARRIER (TYPE 732SW)	LF	508		
78 0460	ANTI-GRAFFITI COATING	SQFT	15,963		
	ELASTOMERIC BEARING PAD	EA	16		
	SHADE STRUCTURE	LS	1		

Add between the 3rd and 4th paragraphs of section 2-1.15C(1):

10-19-18

Submit a copy of the quote from each DVBE listed on the Certified DVBE Summary form that describes the type and dollar amount of work shown on the form no later than 4 p.m. on the 4th business day after bid opening.

Add between the 1st and 2nd paragraphs of section 2-1.18C:

10-19-18

Failure to submit a completed Certified Small Business Listing for the Non–Small Business Preference form by 4 p.m. on the 2nd business day after bid opening will result in a nonresponsive bid.

Replace section 2-1.33B with:

10-19-18

2-1.33B Bid Form Submittal Schedules

2-1.33B(1) General

The *Bid* book includes forms specific to the Contract. The deadlines for the submittal of the forms vary depending on the requirements of each Contract. Determine the requirements of the Contract and submit the forms based on the applicable schedule specified in section 2-1.33B.

Bid forms and information on the form that are due after the time of bid may be submitted at the time of bid.

2-1.33B(2) Federal-Aid Contracts

2-1.33B(2)(a) General

Section 2-1.33B(2) applies to a federal-aid contract.

2-1.33B(2)(b) Contracts with a DBE Goal

2-1.33B(2)(b)(i) General

Section 2-1.33B(2)(b) applies if a DBE goal is shown on the *Notice to Bidders*.

2-1.33B(2)(b)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Federal-Aid Contract with a DBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number
Copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid except for the public works contractor registration number
Copy of the Subcontractor List as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Small Business Status	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid
DBE Commitment	No later than 4 p.m. on the 5th day after bid opening ^b
DBE Confirmation	No later than 4 p.m. on the 5th day after bid opening ^b
DBE Good Faith Efforts Documentation	No later than 4 p.m. on the 5th day after bid opening ^b

^aSubmit only if you choose the option.

^bIf the last day for submitting the bid form falls on a Saturday or holiday, it may be submitted on the next business day with the same effect as if it had been submitted on the day specified.

2-1.33B(2)(b)(iii) Reserved

2-1.33B(2)(c) Contracts without a DBE Goal

2-1.33B(2)(c)(i) General

Section 2-1.33B(2)(c) applies if a DBE goal is not shown on the *Notice to Bidders*.

2-1.33B(2)(c)(ii) Bid Form Schedule

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Federal-Aid Contract without a DBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number
Copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid except for the public works contractor registration number
Copy of the Subcontractor List as submitted at the time of bid with the public works contractor registration numbers	10 days after bid opening
Small Business Status	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid

^aSubmit only if you choose the option.

2-1.33B(2)(c)(iii) Reserved

2-1.33B(2)(d)–2-1.33B(2)(h) Reserved

2-1.33B(3) Non-Federal-Aid Contracts

2-1.33B(3)(a) General

Section 2-1.33B(3) applies to non-federal-aid contracts.

2-1.33B(3)(b) Contracts with a DVBE Goal

2-1.33B(3)(b)(i) General

Section 2-1.33B(3)(b) applies if a DVBE goal is shown on the *Notice to Bidders*.

2-1.33B(3)(b)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

**Bid Form Submittal Schedule for a
Non-Federal-Aid Contract with a DVBE Goal**

Form	Submittal deadline
Bid to the Department of Transportation	Time of bid except for the public works contractor registration number for a joint-venture contract
For a joint-venture contract, copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number	10 days after bid opening
Subcontractor List	Time of bid
Opt Out of Payment Adjustments for Price Index Fluctuations ^a	Time of bid
Certified DVBE Summary	No later than 4 p.m. on the 4th business day after bid opening
California Company Preference	Time of bid
Request for Small Business Preference or Non-Small Business Preference ^a	Time of bid
Certified Small Business Listing for the Non-Small Business Preference ^a	No later than 4 p.m. on the 2nd business day after bid opening

^aSubmit only if you choose the option or preference.

2-1.33B(3)(b)(iii) Reserved

2-1.33B(3)(c) Contracts without a DVBE Goal

2-1.33B(3)(c)(i) General

Section 2-1.33B(3)(c) applies if a DVBE goal is not shown on the *Notice to Bidders*.

2-1.33B(3)(c)(ii) Bid Form Submittal

Submit the bid forms according to the schedule shown in the following table:

AA

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

04-19-19

Replace the 6th through 10th paragraphs of section 7-1.02K(3) with:

04-19-19

You may submit certified payroll records electronically using the Department's secure file transfer protocol site. For information on electronic submission of certified payroll records, go to the Department's Division of Construction website.

Submit payroll records electronically in a nonmodifiable PDF file, using the following file-naming convention:

TT-EA-WE-DOCTYPE.PDF

where:

TT = district, leading zero

EA = Contract number, excluding the district identification number, expressed as 6 characters

WE = week ending date entered as month, leading zero; day of month, leading zero; year, last 2 digits

DOCTYPE = labor payroll document type, CP for Certified Payroll, FB for Fringe Benefit Statement, or SC for Statement of Compliance

Before submitting the payroll records electronically, you and your subcontractors must each complete and sign the Request for Electronic Submission of Certified Payroll Records and e-mail it in PDF format to the district Labor Compliance Office. The Department provides you and your subcontractors' assigned representatives the accounts and user identifications by e-mail after each Request for Electronic Submission of Certified Payroll Records is received.

Each electronic submission must:

1. Include certified payroll records in a nonmodifiable PDF file
2. Include a signed Statement of Compliance form with each weekly record as a nonmodifiable PDF file
3. Be received by the Department by close of business on the 15th day of the month for the prior month's work

Replace the 1st sentence in the 5th paragraph of section 7-1.02K(6)(a) with:

10-19-18

Submit copies of your Injury and Illness Prevention Program, Code of Safe Practices, and permits required by Cal/OSHA as informational submittals.

Replace *Reserved* in section 7-1.02M(2) with:

04-19-19

Submit the names and emergency telephone numbers of the nearest fire suppression agencies before the start of job site activities as an informal submittal. Post the names and phone numbers at a prominent place at the job site.

Cooperate with fire prevention authorities in performance of the work.

Immediately report fires occurring within and near the project limits by dialing 911 and to the nearest fire suppression agency by using the emergency phone numbers retained at the job site.

Prevent project personnel from setting open fires that are not part of the work.

6. Overhead costs.

Termination of the Contract does not relieve the surety of its obligation for any just claims arising out of the work performed.

AA

9 PAYMENT

04-19-19

Replace section 9-1.07B(5) with:

10-19-18

9-1.07B(5) Hot Mix Asphalt Containing Reclaimed Asphalt Pavement

The Engineer calculates the quantity of asphalt in HMA containing RAP using the following formula:

$$Qrap = HMARTT \times Xaa$$

where:

$$Xaa = Xta - [(Xrap \times Xra \times (Xta - 100)) / (100 \times (Xra - 100))]$$

and:

Qrap = quantity in tons of asphalt used in HMA containing RAP

HMARTT = HMA containing RAP, total tons placed

Xaa = asphalt content of HMA containing RAP adjusted to exclude the asphalt content in RAP, expressed as a percentage of the total weight of HMA containing RAP

Xta = total theoretical asphalt content in HMA containing RAP from the job mix formula, expressed as a percentage of the total weight of HMA containing RAP

Xrap = RAP percentage in HMA containing RAP from the job mix formula, expressed as a percentage of the total dry weight of aggregate in HMA containing RAP

Xra = average asphalt content of RAP from the job mix formula, expressed as percentage of total weight of RAP

Replace the 2nd sentence in the 7th paragraph of section 9-1.11E with:

04-19-19

The cost is determined under section 9-1.05 except no markup is allowed.

Replace section 9-1.16C with:

10-19-18

9-1.16C Materials On Hand

A material on hand but not incorporated into the work is eligible for a progress payment if:

1. Compliant with other Contract parts
2. Material cost exceeds either of the following:
 - 2.1. \$50,000
 - 2.2. \$25,000 if the requestor is certified as one or more of the following:
 - 2.2.1. DVBE
 - 2.2.2. DBE
 - 2.2.3. Small business as certified by Department of General Services, Office of Small Business and Disabled Veteran Business Enterprise Services
3. Purchased
4. Invoice is submitted
5. Stored within the State and you submit evidence that the stored material is subject to the Department's control
6. Protected from weather and contamination

Replace the introductory clause in the 1st paragraph of section 11-1.03 with:

04-19-19

Replace clause 6.1.3 of AWS D1.1, the 1st paragraph of clause 9.1.2 of AWS D1.4, and clause 6.1.2 of AWS D1.5 with:

Replace the introductory clause of the 2nd paragraph of section 11-1.04 with:

04-19-19

Replace clause 6.14.6.1 of AWS D1.1, clause 9.8.1 of AWS D1.4, and clause 6.1.3.4 of AWS D1.5 with:

Add before the 1st paragraph of section 11-1.05:

04-19-19

Replace the first sentence of clause 5.21.1.1 of AWS D1.1 with the following:

5.21.1.1. The separation between surfaces of plug and slot welds, and of joints landing on a backing, shall not exceed 1/16 in [2 mm].

Replace clause 3.3.1.1 of AWS D1.5 with the following:

3.3.1.1. The separation between surfaces of plug and slot welds, and of joints landing on a backing, shall not exceed 2 mm [1/16 in].

Replace item 2 in the list in the 2nd paragraph of section 11-1.05 with:

04-19-19

2. Be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria must comply with the applicable AWS codes. The type of mechanical testing must be authorized.

Replace the 1st paragraph of 11-1.06 with:

04-19-19

Replace item 3 of clause 6.26.3.2 of AWS D1.5 with:

3. If indications that exhibit these planar characteristics are present at scanning sensitivity, or other evidence exists to suggest the presence of transverse cracks, a more detailed evaluation of the discontinuity by other means must be performed (e.g., alternate UT techniques, RT, grinding, or gouging for visual inspection or MT of the excavated areas.)

Replace the scanning angle in clause 6.24.2.2 of AWS D1.5 with:

Up to 45 degrees

Replace the 2nd paragraph of section 11-1.06 with:

04-19-19

Clause 6.6.5 of AWS D1.1, clause 9.6.5 of AWS D1.4, and clause 6.6.5 of AWS D1.5 do not apply.

Replace the introductory clause of the 1st paragraph of section 11-2.04 with:

04-19-19

Clauses 6.1.4.1 and 6.1.4.3 of AWS D1.1, the 2nd paragraph of clause 9.1.2 of AWS D1.4, clauses 6.1.3.1 through 6.1.3.3 of AWS D1.5, and clause 7.2.3 of AWS D1.8 are replaced with:

Delete item 2.6.3 in the list of section 13-1.01D(4)(c).

Replace the 1st paragraph of section 13-2.01C with:

04-19-19

Within 7 days after Contract approval, submit one printed copy and an electronic copy on a read-only CD, DVD, or other authorized data-storage device of your WPCP unless different quantities are ordered at the preconstruction conference. You may assign a QSP other than the WPC manager to develop the WPCP.

Replace item 4 in the list in the 2nd paragraph of section 13-2.01C with:

04-19-19

4. Show the locations and types of temporary WPC practices that will be used in the work for whichever has the longest duration in the first:
 - 4.1. 60 days
 - 4.2. Construction phase

Replace the 4th paragraph of section 13-2.01C with:

04-19-19

After the Engineer authorizes the WPCP, submit one printed copy and an electronic copy on a read-only CD, DVD, or other Engineer-authorized data-storage device of the authorized WPCP.

04-19-19

Delete the row for Annual Certification in the table in section 13-3.01C(1).

Replace the 1st paragraph of section 13-3.01C(2)(a) with:

04-19-19

Within 15 days of Contract approval, submit one printed copy and an electronic copy on a read-only CD, DVD, or other authorized data-storage device of your SWPPP unless different quantities are ordered at the preconstruction conference. You may assign a QSD other than the WPC manager to develop the SWPPP.

Replace item 4 in the list in the 2nd paragraph of section 13-3.01C(2)(a) with:

04-19-19

4. Include a schedule showing when:
 - 4.1. Work activities that could cause the discharge of pollutants into stormwater will be performed
 - 4.2. WPC practices, including soil stabilization and sediment control, that will be used in the work for whichever has the longest duration in the first:
 - 4.2.1. 60 days
 - 4.2.2. Construction phase

Replace the 4th paragraph of section 13-3.01C(2)(a) with:

04-19-19

Submit an electronic copy on a read-only CD, DVD, or other Engineer-authorized data-storage device and 4 printed copies of the authorized SWPPP unless fewer quantities are authorized at the preconstruction conference.

Replace the introductory clause in the 7th paragraph of section 13-3.01C(2)(a) with:

DIVISION III EARTHWORK AND LANDSCAPE

19 EARTHWORK

10-19-18

Replace the 1st paragraph of section 19-3.03E(1) with:

10-19-18

Place structure backfill in uniform layers. Bring backfill up uniformly on all sides of structures or drainage facilities. Backfill layer thickness must not exceed 0.67 foot before compacting. If you perform compaction by ponding and jetting, the thickness of the backfill layer must not exceed 4 feet.

Replace the 1st sentence in the 3rd paragraph of section 19-3.03E(1) with:

10-19-18

Do not place structure backfill until footings or other parts of structures or drainage facilities are authorized.

AA

20 LANDSCAPE

04-19-19

Replace the 2nd paragraph of section 20-2.01A(4)(d) with:

10-19-18

In the presence of the Engineer, perform a functional test for each system that demonstrates:

1. Components of the system are functioning and integrated with one another.
2. Controller programming is complete including external weather and other system data inputs that are required to operate the system in automatic mode.
3. Watering schedule is appropriate for the plants, current weather, season, and site conditions.
4. System has complete sprinkler coverage of the site.

Perform the test for each system:

1. Before planting the plants
2. After irrigation system repair work
3. Annually during plant establishment work
4. Not more than 30 days prior to contract acceptance
5. When ordered

10-19-18

Delete section 20-2.01A(4)(e).

Replace the 1st paragraph of section 20-2.01B(5) with:

10-19-18

Pull boxes must comply with section 86-1.02C and be no. 5 or larger. Pull boxes for low voltage conductors must not have side openings.

Replace the 2nd paragraph of section 20-2.01B(5) with:

04-19-19

Pull box covers used for control and neutral conductors for irrigation equipment operated by the irrigation controller must be marked *SPRINKLER CONTROL*.

Add to section 20-2.01B:

04-19-19

20-2.01B(9) Woven Wire Cloth and Gravel

Woven wire cloth must be galvanized and manufactured with a minimum diameter of 19-gauge wire and have square openings from 1/4 to 1/2 inches.

Gravel must be 3/4-inch gravel or crushed rock. Gravel or crushed rock must be clean, washed, dry, and free from clay or organic material.

Replace the 1st paragraph of section 20-2.01C(2) with:

10-19-18

Perform trenching and backfilling under section 87-1.03E(2).

Replace the introductory clause to the list in the 1st paragraph of section 20-2.01C(3) with:

10-19-18

Install pull boxes under section 87-1.03C at the following locations:

Add to section 20-2.01C(4):

04-19-19

Install valve boxes on woven wire cloth and gravel or crushed rock.

Replace the 1st paragraph of section 20-2.04A(4) with:

10-19-18

Perform field tests on control and neutral conductors. Field tests must comply with the specifications in section 87-1.01D(2)(a).

Replace the 1st and 2nd paragraphs of section 20-2.04B with:

10-19-18

Control and neutral conductors must comply with the provisions for conductors and cables in section 86-1.02F.

Electrical conduit and fittings must comply with section 86-1.02(B).

Replace the 1st paragraph of section 20-2.04C(4) with:

04-19-19

Splice conductors with a UL-listed connector manufactured for copper wire, direct burial irrigation systems. Connector must be prefilled with a moisture sealing compound that encapsulates and protects the splice in a waterproof housing. Connector must be sized for the number and gauge of the conductors at the splice.

Replace the introductory clause of the 1st paragraph of section 20-2.06B(3) with:

10-19-18

The irrigation controller enclosure cabinet must comply with section 86-1.02Q and must:

Add to the beginning of section 20-2.06C:

10-19-18

Install the irrigation controller enclosure cabinet under 87-1.03Q(1).

Replace the 3rd paragraph of section 20-2.09B(1) with:

04-19-19

Threaded nipples for swing joints and risers must be schedule 80, PVC 1120 or PVC 1220 pipe, and comply with ASTM D1785.

Replace the table in the 3rd paragraph of section 20-3.01B(2)(a) with:

10-19-18

Plant group designation	Description	Container size (cu in)
A	No. 1 container	152–251
B	No. 5 container	785–1242
C	Balled and burlapped	--
E	Bulb	--
F	In flats	--
H	Cutting	--
I	Pot	--
K	24-inch box	5775–6861
M	Liner ^a	--
O	Acorn	--
P	Plugs ^{a, b}	--
S	Seedling ^c	--
U	No. 15 container	2768–3696
Z	Palm Tree	--

^aDo not use containers made of biodegradable material.

^bGrown in individual container cells.

^cBare root.

Replace the introductory clause of the 1st paragraph of section 20-3.01B(4)(b) with:

10-19-18

Slow-release fertilizer must be a pelleted or granular form with a nutrient release over a 3 to 4 month period and be within the chemical analysis ranges shown in the following table:

Replace section 20-3.01C(3) with:

10-19-18

Water plants as needed to keep the plants in a healthy growing condition.

Replace the 1st paragraph of section 20-4.03G with:

10-19-18

Operate the electric automatic irrigation systems, including external weather and other system data inputs required to operate the system in automatic mode, unless otherwise authorized.

Delete the 3rd paragraph of section 20-4.03G.

10-19-18

Replace the row for *Moisture susceptibility (min, psi, dry strength)* in the table in item 3 in the list in the paragraph of section 39-2.02A(4)(e) with:

04-19-19

For RAP substitution equal to or less than 15% moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
For RAP substitution greater than 15% moisture susceptibility (psi, dry strength)	AASHTO T 283	100-300 ^h

Add a footnote to the table in item 3 in the list in the paragraph of section 39-2.02A(4)(e):

04-19-19

^hNot required in the following areas:

1. Southern San Luis Obispo or Santa Barbara County in District 5.
2. Kern County in District 6.
3. Kings County in District 6: route 5, post mile 0 to 17; route 33, post mile 0 to 19; route 41, post mile 0 to 16.
4. Tulare County in District 6: route 65, post mile 0 to 10; route 99, post mile 0 to 10; route 43, post mile 0 to 15.

Replace the row for *Moisture susceptibility, dry strength* in the table in the 1st paragraph of section 39-2.02B(2) with:

04-19-19

For RAP substitution equal to or less than 15% moisture susceptibility (min, psi, dry strength)	AASHTO T 283	100
For RAP substitution greater than 15% moisture susceptibility (psi, dry strength)	AASHTO T 283	100-300 ^e

Add a footnote to the table in the 1st paragraph of section 39-2.02B(2):

04-19-19

^eNot required in the following areas:

1. Southern San Luis Obispo or Santa Barbara County in District 5.
2. Kern County in District 6.
3. Kings County in District 6: route 5, post mile 0 to 17; route 33, post mile 0 to 19; route 41, post mile 0 to 16.
4. Tulare County in District 6: route 65, post mile 0 to 10; route 99, post mile 0 to 10; route 43, post mile 0 to 15.

Replace the 3rd and 4th paragraphs of section 39-2.02B(2) with:

04-19-19

For RAP substitution of 15 percent or less, the grade of the virgin binder must be the specified grade of asphalt binder for Type A HMA.

For RAP substitution greater than 15 percent and not exceeding 25 percent, the grade of the virgin binder must be the specified grade of asphalt binder for Type A HMA with the upper and lower temperature classification reduced by 6 degrees C. Hamburg wheel track requirements are based on the grade of asphalt binder specified for Type A HMA.

Replace the 2nd paragraph of section 46-1.01C(3) with:

10-19-18

Submit the test data in electronic and hard copy format within 1 business day after testing is complete. Upon completion of the wall, send an email of the soil nail test results as a tabulated spreadsheet to the Engineer and Geotechnical.Data@dot.ca.gov. Include the contract number and Department's structure number of the wall in the subject line of the email.

Replace *Not Used* in section 46-1.01D(1) with:

10-19-18

Welding must comply with AWS D1.1.

Add to the end of section 46-1.03A:

10-19-18

Shotcrete must comply with section 53-2.

Delete the 3rd paragraph of section 46-1.03B.

10-19-18

Replace the 1st sentence in the 2nd paragraph of section 46-2.02B with:

10-19-18

The anchorage enclosure and the steel tube and bearing plate of the anchorage assembly must be galvanized steel and comply with sections 55-1.02D(1) and 55-1.02E(1).

Replace item 9 in the list in the 3rd paragraph of section 46-2.02D with:

10-19-18

9. Have the physical properties shown in Table 4.1 of *Recommendations for Prestressed Rock and Soil Anchors* published by the Post-Tensioning Institute

Replace the 4th paragraph of section 46-2.03D with:

10-19-18

Immediately after lock-off, perform a lift-off test to verify that the lock-off load has been attained. The lift-off load must be within 10 percent of the specified lock-off load. If necessary adjust the shim thickness to achieve the lock-off load. If the load is not within 10 percent of the specified lock-off load, the anchorage must be reset and another lift-off load reading must be made. Repeat the process until the specified lock-off load is obtained.

Replace the 2nd paragraph of section 46-3.01A with:

10-19-18

A soil nail consists of a solid steel bar with an anchorage assembly that is placed in a drilled hole and then grouted.

Replace section 46-3.01D(2)(b)(ii)(1) with:

10-19-18

46-3.01D(2)(b)(ii)(1) General

Determine the test load using the following equation:

$$T = L_b \times Q_b$$

where:

T = test load, pounds

L_b = soil nail bonded length, feet, 10 feet minimum

Q_b = test load per unit length of bond, pounds/foot

Replace the 8th paragraph of section 46-3.01D(2)(b)(ii)(2) with:

04-19-19

If the Engineer revises soil nail lengths or test load per unit length of bond values, any additional verification test soil nails are change order work.

Replace section 46-3.02A with:

04-19-19

46-3.02A General

Each production soil nail must be either a solid steel bar encapsulated full length in a grouted corrugated plastic sheathing or an epoxy-coated prefabricated solid steel bar partially encapsulated in a grouted corrugated plastic sheathing as shown.

Epoxy-coated prefabricated solid steel bars must comply with the specifications for epoxy-coated prefabricated reinforcement in section 52-2.03, except the average coating thickness after curing must be from 10 to 15 mils.

Solid steel bar for test soil nails is not required to be epoxy coated or encapsulated in grouted plastic sheathing.

Replace the heading of section 46-3.02B with:

10-19-18

Anchorage Assemblies

Replace section 46-3.02C with:

10-19-18

46-3.02C Solid Steel Bars

Solid steel bars must be either:

1. Threaded bars with spirally-deformed, ribbed threads continuous along the entire length of the bar.
2. Deformed reinforcing bars with at least a 6-inch length of thread cut into the bar on the anchorage end. Use coarse threading and the next larger reinforcing bar size.

Solid steel bars must comply with ASTM A615/A615M or A706/A706M, Grade 60 or ASTM A615/A615M, Grade 75.

Splicing must be authorized.

Epoxy coating at the anchorage end of epoxy-coated bars may be omitted for a maximum of 6 inches. Metal surfaces of assembled splices of epoxy-coated bars must be epoxy coated.

Choose the solid steel bar size and grade for test soil nails. Test soil nail bars must not be smaller than the production soil nails they represent.

Replace the 4th paragraph of section 48-2.02B(2) with:

10-19-18

The assumed horizontal load the falsework bracing system must resist must be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and a wind loading. The assumed horizontal load in any direction must be at least 2 percent of the total dead load.

Replace the table in the 2nd paragraph of section 48-2.02B(3)(b) with:

10-19-18

Quality characteristic	Requirement
Compression perpendicular to the grain (psi)	450
Compression parallel to the grain (psi)	$480,000/(L/d)^2$; 1,600 maximum
Flexural stress	1,800 psi; 1,500 psi maximum for members with a nominal depth of 8 inches or less.
Horizontal shear (psi)	140
Axial tension (psi)	1,200
Deflection due to concrete loading only	1/240 of span length
Modulus of elasticity (E) (psi)	1.6×10^6
Timber piles (tons)	45

NOTES:

L = unsupported length, inches

d = least dimension of a square or rectangular column or the width of a square of equivalent cross-sectional area for round columns, inches

Replace the table in the 3rd paragraph of section 48-2.02B(3)(c) with:

10-19-18

Quality characteristic	Requirement
Compression, flexural (psi)	$12,000,000/[(L \times d)/(b \times t)]^a$
Deflection due to concrete loading only	1/240 of the span
Modulus of elasticity (E) (psi)	30×10^6

NOTES:

L = unsupported length, inches

d = least dimension of rectangular columns or the width of a square of equivalent cross-sectional area for round columns, or the depth of beams, inches

b = width of the compression flange, inches

t = thickness of the compression flange, inches

F_y = specified minimum yield stress in psi

^aNot to exceed (1) 22,000 psi for unidentified steel, (2) 22,000 psi for steel complying with ASTM A36/A36M, or (3) $0.6F_y$ for other identified steel

Add to section 48-2.02:

10-19-18

48-2.02C Falsework Lighting

48-2.02C(1) General

Reserved

48-2.02C(2) Pavement Illumination

Pavement illumination fixture must:

1. Have commercial-type flood lamp holder with protective covers.
2. Be fully adjustable with brackets and locking screws.
3. Mount directly to a standard metal junction box.

4. Have a medium-base PAR-38 quartz-halogen flood lamp or an equivalent energy efficient alternative emitting 1,700 to 2,200 lumens with a correlated color temperature of 3,000 kelvin or less.

48-2.02C(3) Portal Illumination

Portal illumination includes plywood sheet clearance guides 4 feet wide by 8 feet high and fixtures with a PAR reflector floodlamp or equivalent energy efficient alternatives emitting 1,500 to 1,700 lumens with a correlated color temperature of 3,000 kelvin or less.

48-2.02C(4) Pedestrian Walkway Illumination

Pedestrian walkway illumination fixtures must be the flush mounted type equipped with a damage-resistant, clear, polycarbonate diffuser lens, an overhead protection shield, and a standard incandescent lamp or equivalent energy efficient alternatives emitting 1,500 to 2,000 lumens with a correlated color temperature of 3,000 kelvin or less.

Add to section 48-2.03A:

10-19-18

Traffic must be detoured, from the lanes over which falsework is being erected, released, or removed.

Replace the 3rd paragraph of section 48-2.03B with:

10-19-18

Falsework piles must be driven and assessed under section 49. The actual nominal pile resistance must be at least twice the falsework pile design load. For pile acceptance, the required number of hammer blows in the last foot of driving is determined using the formula in 49-2.01A(4)(c).

Add between the 2nd and 3rd paragraphs of section 48-2.03C:

10-19-18

Falsework erection includes adjustments or removal of components that contribute to the horizontal stability of the falsework system.

Replace section 48-2.03D with:

10-19-18

48-2.03D Removal

Remove falsework such that portions of falsework not yet removed remain stable at all times.

Falsework release includes blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

Except for concrete above the deck, do not release falsework supporting any span of a:

1. Simple span bridge before 10 days after the last concrete has been placed
2. Continuous or rigid frame bridge before 10 days after the last concrete has been placed:
 - 2.1. In that span
 - 2.2. In adjacent portions of each adjoining span for a length equal to one-half of the span where falsework is to be released
3. Simple span, continuous, or rigid frame bridge until the supported concrete has attained a compressive strength of 2,880 psi or 80 percent of the specified strength, whichever is greater

Do not release falsework for prestressed portions of structures until prestressing steel has been tensioned.

Do not release falsework supporting any span of a continuous or rigid frame bridge until all required prestressing is complete (1) in that span and (2) in adjacent portions of each adjoining span for a length equal to at least one half of the span where falsework is to be released.

Release falsework supporting spans of CIP girders, slab bridges, or culverts before constructing or installing railings or barriers on the spans unless authorized.

Release falsework for arch bridges uniformly and gradually. Start at the crown and work toward the springing. Release falsework for adjacent arch spans concurrently.

Do not release falsework that supports overhangs, deck slabs between girders, or girder stems that slope 45 degrees or more from vertical before 7 days after deck concrete has been placed.

You may release falsework supporting the sides of girder stems that slope less than 45 degrees from vertical before placing deck concrete if you install lateral supports. Lateral supports must be:

1. Designed to resist rotational forces on the girder stem, including forces due to concrete deck placement
2. Installed immediately after each form panel is removed
3. Installed before releasing supports for the adjacent form panel

Do not release falsework for bent caps supporting steel or PC concrete girders before 7 days after placing bent cap concrete.

Release falsework for structural members subject to bending as specified for simple span bridges.

Do not release falsework for box culverts and other structures with decks lower than the roadway pavement and span lengths of 14 feet or less until the last placed concrete has attained a compressive strength of 1,600 psi. Curing of the concrete must not be interrupted. Falsework release for other box culverts must comply with the specifications for the release of bridge falsework.

Do not release falsework for arch culverts sooner than 40 hours after concrete has been placed.

Remove falsework piling to at least 2 feet below the original ground or streambed. Remove falsework piling driven within ditch or channel excavation limits to at least 2 feet below the bottom and side slopes of the excavated areas.

Dispose of falsework materials and work debris.

Falsework removal systems employing methods of holding falsework by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must also be supported by an independent support system when the falsework removal system is not actively lowering the falsework at vehicular, pedestrian, or railroad traffic openings.

Bridge deck openings used to facilitate falsework removal activities must be formed with a 6-inch maximum diameter opening. The opening must be located away from the wheel paths.

Clean and roughen openings made in the bridge deck. Fill the deck openings with rapid setting concrete complying with section 60-3.02B(2).

Bridge soffit openings used to facilitate falsework removal activities must be formed with a 5-inch maximum diameter.

Anchor 10-inch-square aluminum or galvanized steel wire, 1/4-inch-mesh hardware cloth with a 0.025-inch minimum wire diameter firmly to the inside of the soffit openings. Construct a 1/2-inch drip groove to the outside of soffit openings.

Falsework removal over roadways with a vertical traffic opening of less than 20 feet must start within 14 days after the falsework is eligible to be released and must be completed within 45 days after it is eligible to be released.

Replace section 48-2.03E with:

10-19-18

48-2.03E Falsework Lighting

48-2.03E(1) General

Provide lighting to illuminate the pavement, portals, and pedestrian walkways at or under openings in the falsework required for traffic.

Install lighting for pedestrian walkway illumination at all pedestrian openings through or under the falsework.

Design falsework lighting such that required maintenance can be performed with a minimum of inconvenience to traffic. Closing of traffic lanes for routine maintenance is not allowed on roadways with posted speed limits greater than 25 mph.

During the hours of darkness, illuminate:

1. Falsework portals
2. Pavement under falsework with portals less than 150 feet apart

Use photoelectric switches to control falsework lighting systems. Pavement under falsework with portals 150 feet or more apart and all pedestrian openings through falsework must be illuminated 24 hours per day.

Aim the lighting fixtures to avoid glare to motorists.

Fasten a Type NMC cable with no. 12 minimum conductors with ground wire to the supporting structure at sufficient intervals to adequately support the cable and within 12 inches from every box or fitting. Use 1/2-inch or larger Type 1 conduit for conductors within 8 feet of ground.

Provide a maximum 20 A fuse for each branch circuit for illumination systems at each bridge location.

Arrange with the service utility to complete service connections for falsework lighting. You pay for energy, line extension, service, and service hookup costs.

48-2.03E(2) Pavement Illumination

Install a continuous row of fixtures beneath falsework structure with the end fixtures not further than 10 feet inside portal faces. Energize the fixtures immediately after the members supporting them have been erected.

Place the fixtures along the sides of the opening not more than 4 feet behind or 2 feet in front of the roadway face of the temporary railing. Mount the fixtures from 12 to 16 feet above the roadway surface without obstructing the light pattern on the pavement.

48-2.03E(3) Portal Illumination

Provide falsework portal illumination on the side facing traffic. Mount fixtures on the structure directly over each vertical support adjacent to the traveled way, as needed, to uniformly illuminate the exterior falsework beam, the clearance guides, and the overhead clearance sign. Each fixture must be supported approximately 16 feet above the pavement and 6 feet in front of the portal face.

Portal illumination clearance guides must:

1. Be fastened vertically, facing traffic, with the bottom of the panel from 3 to 4 feet above the roadway
2. Have the center of the panel located approximately 3 feet horizontally behind the roadway face of the railing
3. Be freshly painted panels for each installation with not less than 2 applications of flat white paint.

Paint testing of painted panels not required.

Portal lighting and clearance guides must be installed on the day the vertical members are erected.

If ordered, repaint the designated areas to improve the general appearance of the painted surfaces. Repainting is change order work.

48-2.03E(4) Pedestrian Walkway Illumination

Provide pedestrian walkway illumination immediately after the overhead protection shield is erected.

Flush mount the fixtures in the overhead protection shield and center them over the passageway at intervals of not more than 15 feet with the end fixtures not more than 7 feet inside the end of the pedestrian openings.

10-19-18

Delete the 4th paragraph of section 48-3.01C(2).

Add between the 9th and 10th paragraphs of section 48-3.02B:

10-19-18

For bridge removal, the temporary support system must resist the design loads and forces shown. As a minimum, the horizontal load to be resisted in any direction for temporary support shoring and temporary bracing must be (1) the sum of actual horizontal loads due to equipment, construction sequence, or other causes plus an allowance for wind and (2) not less than 5 percent of the total dead load of the structure being removed.

10-19-18

Delete the 2nd and 3rd paragraphs of section 48-4.01A.

Replace section 48-4.01C with:

10-19-18

48-4.01C Submittals

Submit shop drawings for temporary decking. Include the following:

1. Description, location, and value of all loads if temporary decking is not shown
2. Details of the connection between the temporary decking and the existing or new structure if temporary decking is not shown
3. Storage location of equipment and materials that allows for 1 shift of work and placement of temporary decking within the time allowed
4. Construction sequence and schedule details
5. Cure time for concrete to be placed under a steel plate system
6. Details for removing temporary decking and restoring the existing structure

If temporary decking is not shown, shop drawings must be signed by an engineer who is registered as a civil engineer in the State.

Replace section 48-4.01D with:

10-19-18

48-4.01D Quality Assurance

If temporary decking is not shown, the temporary decking design must comply with:

1. The unfactored permit loads, braking force, and HL93 loads except lane load from *AASHTO LRFD Bridge Specifications with California Amendments*.
2. Section 48-2.02B(3)
3. Live load deflection must not exceed 1/300 of the temporary decking span for the design load.
4. Temporary decking must have a uniform surface with a coefficient of friction of at least 0.35 when measured under California Test 342.
5. Steel plate systems must be mechanically connected to the existing structure and adjacent approaches. If a steel plate spans a joint, the mechanical connection must accommodate at least 50 percent of the movement rating shown for that joint.

6. Must not overstress, induce permanent forces into, or produce cracking in the existing structure.

Replace section 48-4.03 with:

10-19-18

48-4.03 CONSTRUCTION

Temporary decking must consist of one of the following:

1. Steel plate system that spans the incomplete work.
2. Falsework with an asphalt concrete surface that spans the incomplete work. Do not use falsework with an asphalt concrete surface to cover deck concrete that has not cured or to cover partially installed joint materials.

Construct temporary decking under the specifications for falsework in section 48-2 except the first paragraph of section 48-2.03D does not apply.

If there is an elevation difference of more than 1/2 inch between the temporary decking and the adjacent deck, install temporary tapers up to and away from the temporary decking. Construct tapers under section 7-1.03. If the temporary decking does not extend the entire width of the roadway, taper the sides of the temporary decking at a 12:1 (horizontal: vertical) ratio.

Material for temporary tapers must comply with section 60-3.02B(2) or 60-3.04B(2). Cure temporary tapers at least 3 hours before allowing traffic on the temporary decking.

If unanticipated displacements, cracking, or other damage occurs to the existing structure or to any new components installed in or adjacent to the deck, stop work on the deck and perform corrective measures.

Edges of steel plate systems must be in full contact with the existing deck and the adjacent approach slab. If used, shims must be securely attached to the plate.

For falsework with an asphalt concrete cover, asphalt concrete must be at least 3 inches thick and compacted in place.

Do not allow traffic on deck concrete until it has attained the design compressive strength shown.

When temporary decking is no longer needed, remove temporary decking materials and connections from the existing structure as soon as possible. Remove modifications to the existing structure except where permanent alterations are shown.

10-19-18

Delete the 4th paragraph of section 48-5.01C.

Replace the 1st paragraph of section 48-5.02B with:

10-19-18

The jacking support system must resist the structure dead load and lateral design forces shown, plus any additional loads from jacking equipment and activities. As a minimum, the horizontal load to be resisted in any direction for the jacking support system and temporary bracing must be (1) the sum of actual horizontal loads due to equipment, construction sequence, or other causes plus an allowance for wind as specified in Section 48-2.02B(2) and (2) not less than 2 percent of the total dead load of the structure being jacked. You must determine soil bearing values for support footings. If the jacking support stiffness exceeds the described minimum stiffness, increase the lateral design forces to be compatible with the jacking support lateral stiffness.

Replace the 1st paragraph of section 48-5.03 with:

10-19-18

Construct the jacking support system under the specifications for falsework in section 48-2.03.

AA

49 PILING

04-19-19

Replace the 6th paragraph of section 49-1.01D(4) with:

10-19-18

Except for load test piles and anchor piles, drive the 1st production pile in the control zone. Do not install any additional production piles until dynamic monitoring has been performed, and the Engineer provides you with the bearing acceptance criteria curves for any piles represented by the dynamically monitored piles.

Replace the 3rd paragraph of section 49-2.01D with:

10-19-18

The payment quantity for furnish piling is the length measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff, except for dynamically monitored piles. For dynamically monitored piles, the payment quantity for furnish piling includes an additional length of 2 times the largest cross-sectional dimension of the pile plus 2 feet.

Add to the end of section 49-2.02A(2):

10-19-18

longitudinal weld length: The length of a continuous longitudinal weld.

circumferential weld length: The length of a continuous weld around the circumference of the pipe pile.

spiral weld length: The length of one full 360-degree spiral weld revolution around the circumference of the pipe pile.

Replace the 3rd paragraph of section 49-2.02A(4)(b)(iii)(B) with:

10-19-18

For welding performed under AWS D1.1:

1. Perform NDT on 25 percent of each longitudinal, circumferential, or spiral weld length using RT or UT.
2. If repairs are required in a portion of the tested weld:
 - 2.1. Perform additional NDT on untested areas on each end of the initial portion tested. The length of additional NDT on each end must equal 10 percent of the weld length. If it is not possible to perform 10 percent of the weld length on one end, perform the remaining percentage on the other end.
 - 2.2. After this additional 20 percent of NDT is performed, determine and record the total cumulative repair lengths from all NDT for each weld length. If the cumulative weld repair length is equal to or more than 10 percent of the weld length, then perform NDT on the entire weld length.
 - 2.3. Perform NDT on the repaired portion plus 2 inches on each end of the repaired weld excavation.

Replace the 2nd paragraph of section 49-2.02A(4)(b)(iii)(C) with:

10-19-18

Perform NDT on 25 percent of the weld length performed by each welder, using RT or UT at locations selected by the Engineer. The Engineer may select several locations on a given splice. The cover pass must be ground smooth at locations to be tested.

Replace the 4th paragraph of section 49-2.02A(4)(b)(iii)(C) with:

10-19-18

If repairs are required in a portion of the tested weld:

1. Perform additional NDT on untested areas on each end of the initial portion tested. The length of additional NDT on each end must equal 10 percent of the pipe's outside circumference. If it is not possible to perform 10 percent of the weld length on one end, perform the remaining percentage on the other end.
2. After this additional 20 percent of NDT is performed, determine and record the total cumulative repair lengths from all NDT for each weld length. If the cumulative weld repair length is equal to or more than 10 percent of the pipe's outside circumference, then perform NDT on the entire weld length.
3. Perform NDT on the repaired portion plus 2 inches on each end of the repaired weld excavation.

Replace the 5th paragraph of section 49-2.02B(1)(b) with:

04-19-19

If splicing steel pipe piles using a circumferential weld, the piles must comply with the fit-up requirements of clause 9.24.1 of AWS D1.1.

Replace section 49-3.01B(2) with:

04-19-19

49-3.01B(2) Mass Concrete

Section 49-3.01B(2) applies to CIP concrete piles with a diameter greater than 8 feet.

For piles with a diameter greater than 8 feet and less than or equal to 14 feet:

1. The specifications for SCM content in the 4th paragraph of section 90-1.02B(3) do not apply.
2. The SCM content of the concrete must comply with the following:
 - 2.1. Any combination of portland cement and fly ash satisfying:

Equation 1:

$$(12 \times FM)/MC \geq X$$

where:

FM = fly ash complying with AASHTO M 295, Class F, with a CaO content of up to 10 percent, including the quantity in blended cement, lb/cu yd

MC = minimum quantity of cementitious material specified, lb/cu yd

X = 3.0 for 8 < *D* ≤ 10, where *D* = pile diameter in feet

X = 4.0 for 10 < *D* ≤ 14, where *D* = pile diameter in feet

Equation 2:

$$MC - MSCM - PC \geq 0$$

where:

MC = minimum quantity of cementitious material specified, lb/cu yd

MSCM = minimum sum of SCMs that satisfies equation 1, lb/cu yd

PC = quantity of portland cement, including the quantity in blended cement, lb/cu yd

- 2.2. You may replace any portion of the portland cement with any SCM complying with section 90-1.02B(3) if equations 1 and 2 are satisfied as specified above.

For piles with a diameter greater than 14 feet, the concrete must comply with the specifications for mass concrete in section 51-6.

Add to the end of section 49-3.02C(1):

04-19-19

You may construct CIDH concrete piles 24 inches in diameter or larger by excavating and depositing concrete under slurry.

Delete the 2nd paragraph of section 49-3.02C(8).

04-19-19

Replace section 49-4.01 with:

04-19-19

49-4.01 GENERAL

49-4.01A Summary

Section 49-4 includes specifications for drilling holes and installing steel soldier piles in the holes.

Steel soldier piles must comply with section 49-2.03.

49-4.01B Definitions

Reserved

49-4.01C Submittals

Reserved

49-4.01D Quality Assurance

Reserved

AA

51 CONCRETE STRUCTURES

04-19-19

Add to the beginning of section 51-1.01C(1):

04-19-19

If ordered, submit concrete form design and materials data for each forming system.

Add to section 51-1.03:

10-19-18

51-1.03J Temporary Decking

If you are unable to complete bridge reconstruction activities before the bridge is to be opened to traffic, furnish and maintain temporary decking under section 48-4 until that portion of the work is complete.

Replace the 2nd paragraph of section 51-4.01C(1) with:

04-19-19

For PC PS concrete girders and deck panels, submit an erection work plan. The work plan must be signed by an engineer who is registered as a civil engineer in the State and include procedures, details, and sequences for:

1. Unloading
2. Lifting
3. Erecting

4. Temporary bracing installation

Replace the 1st paragraph of section 51-4.01C(2)(a) with:

04-19-19

Submit shop drawings for PC concrete members to the OSD Documents Unit unless otherwise specified.

Replace *Reserved* in section 51-4.01C(2)(e) with:

04-19-19

For PC deck panels, shop drawings must include:

1. Panel materials, shapes, and dimensions.
2. Deck panel layout identifying the locations of each panel.
3. Reinforcing, joint, and connection details.
4. Complete details of the methods, materials, and equipment used in prestressing and precasting work.
5. Type of texture and method of forming the textured finish.
6. Methods and details for lifting, bracing, and erection.
7. Method of support and grade adjustment.
8. Methods of sealing against concrete leaks.

Replace the 2nd paragraph of section 51-4.02B with:

04-19-19

Handle, store, transport, and erect PC members in a position such that the points of support and directions of the reactions with respect to the member are approximately the same as when the member is in its final position.

Replace *Reserved* in section 51-4.02D(7) with:

04-19-19

Clearly label the top surface of each panel with the word *TOP* as shown on the deck panel layout using waterproof paint or other authorized means.

Apply a coarse texture to at least 90 percent of the deck panel top surface area by brooming with a stiff bristled broom or by other suitable devices that results in uniform scoring parallel with the prestressing strands. The top surface texture must have a maximum 1/8-inch texture.

Each camber strip must:

1. Consist of high density expanded polystyrene with a minimum compressive strength of 55 psi.
2. Consist of a single layer and extend continuously under each deck panel.
3. Achieve a height that accounts for roadway profile, cross slope, and girder camber.
4. Have 1/4-inch v-notches or 1/2 by 1/2-inch slots cut into the top surface on 4-foot centers.

Camber strip dimensions must comply with the following table:

Polystyrene Camber Strip Dimensions

Height (H) (inches)	Width (W) (inches)
1 to 2.5	1.5
Greater than 2.5 and less than or equal to 3.5	1.75
Greater than 3.5 and less than or equal to 4	2

Chemical adhesive must be suitable for use with concrete and polystyrene.

Nondestructive Testing for Steel Standards and Poles

Weld location	Weld type	Minimum required NDT
Circumferential splices around the perimeter of tubular sections, poles, and arms	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam	CJP or PJP groove weld	Random 25% MT
Longitudinal seam within 6 inches of a circumferential weld	CJP groove weld	100% UT or RT
Welds attaching base plates, flange plates, pole plates, or mast arm plates to poles or arm tubes	CJP groove weld with backing ring and reinforcing fillet	t ≥ 1/4 inch: 100% UT and 100% MT t < 1/4 inch: 100% MT after final weld pass
	External (top) fillet weld for socket-type connections	100% MT
Hand holes and other appurtenances	Fillet and PJP welds	MT full length on random 25% of all standards and poles
Longitudinal seam on the telescopic female end, designated slip-fit length plus 6 inches	CJP groove weld	100% UT or RT

NOTE: t = pole or arm thickness

Replace the 2nd paragraph of section 59-1.02C with:

10-19-18

Coatings selected for use must comply with the volatile organic compound concentration limits specified for the air quality district where the coating is applied. The undercoats and finish or final coats selected for use must be compatible with each other.

Add after the paragraph of section 59-2.01A(3)(a):

10-19-18

If requested by the Engineer, submit documentation from the coating manufacturer verifying the compatibility of the undercoats and finish or final coats selected for use.

AA

60 EXISTING STRUCTURES

04-19-19

Replace section 60-2.02B with:

04-19-19

60-2.02B Materials

Design criteria for temporary support shoring and temporary bracing must comply with section 48-3.02B.

Add to section 60-3.01A:

10-19-18

If you are unable to complete bridge reconstruction activities before the bridge is to be opened to traffic, furnish and maintain temporary decking under section 48-4 until that portion of the work is complete.

Replace the 3rd and 4th paragraphs of section 60-3.02C(3) with:

04-19-19

Remove asphalt concrete surfacing by cold milling under the following conditions:

1. If a membrane seal is shown:
 - 1.1. Remove the seal by cold milling
 - 1.2. Do not remove more than 1/2 inch of the existing concrete slab

2. If a membrane seal is not shown:
 - 2.1. Remove asphalt concrete surfacing until a 1/2-inch minimum of surfacing remains on top of existing concrete slab
 - 2.2. Use other authorized means to remove the remaining asphalt concrete without damage to the concrete slab

Add to section 60-3.02C(3):

04-19-19

Where a portion of the asphalt concrete surfacing is to remain, saw cut a 2-inch-deep true line along the edge to remain in place before removing asphalt concrete. Remove the asphalt concrete without damaging the surfacing to remain in place.

DIVISION VIII MISCELLANEOUS CONSTRUCTION

78 INCIDENTAL CONSTRUCTION

04-19-19

Replace section 78-4.03 with:

04-19-19

78-4.03 PAINTING CONCRETE

78-4.03A General

78-4.03A(1) Summary

Section 78-4.03 includes specifications for preparing and painting concrete surfaces.

78-4.03A(2) Definitions

Reserved

78-4.03A(3) Submittals

Submit the coating manufacturer's application instructions at least 7 days before use.

78-4.03A(4) Quality Assurance

Reserved

78-4.03B Materials

Coatings for concrete must comply with the specifications for acrylic emulsion paint for exterior masonry in section 91-4.02B.

Coatings must be white.

78-4.03C Construction

78-4.03C(1) General

Reserved

78-4.03C(2) Surface Preparation

Before painting, surfaces must be:

1. At least 28 days old.
2. Prepared under SSPC-SP 13/NACE no. 6. Pressure rinse the prepared surfaces before applying the paint.
3. Thoroughly dry. You may use artificial drying methods if authorized.

78-4.03C(3) Application

Apply at least 2 coats under the manufacturer's instructions and SSPC-PA 7. Protect adjacent surfaces during painting using an authorized method.

78-4.03D Payment

Not Used

Replace section 78-4.04 with:

04-19-19

78-4.04 STAINING CONCRETE AND SHOTCRETE

78-4.04A General

78-4.04A(1) Summary

Section 78-4.04 includes specifications for preparing and staining concrete and shotcrete surfaces.

78-4.04A(2) Definitions

acid stain: non-tintable, transparent stain that contains dilute acid.

water-based stain: semi-transparent or solid water-based coating in an acrylic emulsion vehicle, that can be tinted to match an AMS-STD-595 color.

78-4.04A(3) Submittals

78-4.04A(3)(a) General

Submit the stain and sealer manufacturer's product data and application instructions at least 7 days before starting staining activities.

78-4.04A(3)(b) Contractor Qualifications

Submit the following documentation at least 10 days before the prestaining meeting:

1. Summary of the staining contractor's experience that demonstrates compliance with section 78-4.04A(4)(c).
2. List of at least 3 projects completed in the last 5 years that demonstrate the staining contractor's ability to stain surfaces similar to the surfaces for this project. For each project include:
 - 2.1. Project description
 - 2.2. Name and phone number of the owner
 - 2.3. Staining completion date
 - 2.4. Color photos of the completed stained surface

78-4.04A(3)(c) Staining Quality Work Plan

Submit a staining quality work plan at least 10 days before the prestaining meeting. The work plan must include details for preparing and staining the surfaces to achieve the required color, and for sealing the surfaces, including:

1. Number of applications that will be used to apply the stain
2. For each application of the stain, a description of:
 - 2.1. Manufacturer, color, finish, and percentage strength mixture of the stain that will be applied
 - 2.2. Proposed methods and tools for applying the stain
3. Proposed methods for protecting adjacent surfaces during staining
4. Proposed methods and tools for applying the sealer

For acid stains, the work plan must also include a rinse water collection plan for containing all liquid, effluent, and residue resulting from preparing and staining the surfaces.

78-4.04A(4) Quality Assurance

78-4.04A(4)(a) General

Reserved

78-4.04A(4)(b) Test Panels

Stain the authorized test panel complying with section 51-1.01D(2)(c) or section 53-3.01D(3).

The test panel must be:

1. Stained 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 staining before starting the staining work

If ordered, construct additional test panels until a satisfactory color is attained. The preparing and staining of additional test panels is change order work.

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

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

78-4.04A(4)(c) Contractor Qualifications

The staining contractor must have experience staining surfaces to simulate the appearance of natural rock formations or stone masonry, and must have completed at least 3 projects in the past 5 years involving staining of surfaces similar to the surfaces for this project.

78-4.04A(4)(d) Prestaining Meeting

Before starting staining activities, conduct a meeting to discuss the staining quality work plan. Meeting attendees must include the Engineer and all staining contractors.

78-4.04B Materials

78-4.04B(1) General

Reserved

78-4.04B(2) Stain

78-4.04B(2)(a) General

The stain must be:

1. Commercially available product designed specifically for exterior applications
2. Specifically manufactured for staining concrete surfaces

78-4.04B(2)(b) Acid Stain

Acid stain must:

1. Contain dilute acid that penetrates and etches the surfaces
2. Be a water-based solution of inorganic metallic salts
3. Produce abrasion-resistant color deposits

78-4.04B(2)(c) Water-based Stain

Water-based stain must be:

1. Acrylic emulsion
2. Non-fading and UV resistant
3. Capable of producing irregular, mottled tones

78-4.04B(3) Sealer

The sealer must be as recommended by the stain manufacturer, clear and colorless, and have a matte finish when dry.

78-4.04B(4) Joint Sealing Compound

Reserved

78-4.04C Construction

78-4.04C(1) General

At locations where there is exposed metal adjacent to the surfaces to be stained, seal the joint between the surfaces to be stained and the exposed metal with a joint sealing compound before applying the stain.

78-4.04C(2) Surface Preparation

Test surfaces for acceptance of the stain before applying the stain. Clean surfaces that resist accepting the stain and retest until passing.

Before staining, the surfaces must be:

1. At least 28 days old
2. Prepared under SSPC-SP 13/NACE no. 6
3. Thoroughly dry

DIVISION IX TRAFFIC CONTROL DEVICES

82 SIGNS AND MARKERS

04-19-19

Replace the list in the 1st paragraph of section 82-2.01C with:

04-19-19

1. Aluminum sheeting
2. Retroreflective sheeting
3. Color imaging methods and film
4. Protective-overlay film

Replace section 82-2.02D with:

04-19-19

82-2.02D Color Imaging Methods and Film

The material used for color imaging methods, film, and protective-overlay must be recommended by the retroreflective sheeting manufacturer.

Colored retroreflective sheeting must be used for the background.

Signs with green, red, blue, or brown backgrounds may use reverse-screened-process color on white retroreflective sheeting for the background color. The coefficient of retroreflection must be at least 70 percent of the coefficient of retroreflection specified in ASTM D4956 for the corresponding color of retroreflective sheeting.

The sign must have outdoor weatherability characteristics equivalent to those specified for the corresponding color of retroreflective sheeting in ASTM D4956.

Replace section 82-5.01A with:

10-19-18

Section 82-5 includes specifications for fabricating and installing markers, including milepost markers.

Replace the 2nd paragraph in section 82-5.02E with:

10-19-18

A target plate for milepost marker or Type L-1 (CA) or Type L-2 (CA) object marker installed on a metal post must be manufactured from an aluminum sheet or zinc-coated steel sheet.

Replace section 82-5.02H with:

10-19-18

82-5.02H Milepost Markers

Letters and numerals on a milepost marker must be made with opaque black paint or film. The paint and film must have an equivalent outdoor weatherability as the retroreflective sheeting specified in ASTM D4956. Nonreflective, opaque, black film must be vinyl or acrylic material.

Film for letters and numerals must be computer cut and have pressure-sensitive adhesive.

Replace the 5th paragraph of section 82-5.03 with:

10-19-18

Use stencils to paint letters and numerals on milepost markers.

AA

83 RAILINGS AND BARRIERS

04-19-19

Replace section 83-2.01A(3) with:

04-19-19

For midwest guardrail systems and thrie beam barrier, install steel foundation tubes and soil plates in soil.

Replace the 4th paragraph of section 83-2.03C with:

04-19-19

If median barrier delineation is shown, match the barrier marker spacing to the raised pavement marker spacing on the adjacent median edge line pavement delineation.

Replace the paragraph of section 83-3.03A(11) with:

04-19-19

Where concrete barrier markers are shown, cement the markers to the barrier under the manufacturer's instructions. Match the barrier marker spacing to the raised pavement marker spacing on the adjacent median edge line pavement delineation.

AA

84 MARKINGS

04-19-19

Replace section 84-2 with:

10-19-18

84-2 TRAFFIC STRIPES AND PAVEMENT MARKINGS

84-2.01 GENERAL

84-2.01A Summary

Section 84-2 includes specifications for applying traffic stripes and pavement markings.

Traffic stripes and pavement markings must comply with ASTM D6628 for daytime and nighttime color.

Retroreflectivity must be measured under ASTM E1710 and the sampling protocol specified in ASTM D7585.

84-2.01B Definitions

pavement marking: Transverse marking such as (1) a limit line, (2) a stop line, or (3) a word, symbol, shoulder, parking stall, or railroad-grade-crossing marking.

traffic stripe: Longitudinal centerline or lane line used for separating traffic lanes in the same direction of travel or in the opposing direction of travel or a longitudinal edge line marking the edge of the traveled way or the edge of a lane at a gore area separating traffic at an exit or entrance ramp. A traffic stripe is shown as a traffic line.

84-2.01C Submittals

For each lot or batch of traffic stripe material, primer, and glass beads, submit:

1. Certificate of compliance, including the material name, lot or batch number, and manufacture date
2. METS notification letter stating that the material is authorized for use, except for thermoplastic and primer
3. SDS
4. Manufacturer's Instructions

For each lot or batch of thermoplastic, submit a manufacturer's certificate of compliance and the following test results from the California Test 423:

1. Brookfield Thermosel viscosity
2. Hardness
3. Yellowness index, white only
4. Daytime luminance factor
5. Yellow color, yellow only
6. Glass bead content
7. Binder content

The date of the test must be within 1 year of use.

Submit test results for each lot of beads specifying the EPA test methods used and tracing the lot to the specific test sample. The testing for lead and arsenic content must be performed by an independent testing laboratory.

Submit the thermoplastic test stripe to the Engineer.

Submit the retroreflectivity test result within 5 days of testing the traffic stripes and pavement markings. The data must include the retroreflectivity, time, date, and GPS coordinates for each measurement.

84-2.01D Quality Assurance

84-2.01D(1) General

Reserved

84-2.01D(2) Quality Control

Before starting permanent application of methyl methacrylate and two component paint traffic stripes and pavement markings, apply a test stripe on roofing felt or other suitable material in the presence of the Engineer. The test stripe section must be at least 50 feet in length.

Upon request, apply a thermoplastic test stripe on suitable material in the presence of the Engineer during the application of thermoplastic traffic stripes or markings. The test stripe must be at least 1 foot in length.

Remove loose glass beads before measuring the retroreflectivity. Obtain authorization to proceed with the application of traffic stripes and pavement markings.

Within 30 days of application, test the traffic stripes and pavement markings under the test methods and frequencies shown in the following table:

Traffic Stripe Testing Frequency

Quality characteristic	Test method	Minimum sampling and testing frequency
Initial retroreflectivity (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)	ASTM E1710	ASTM D7585 ^a
White		
Yellow		

^aUse the referee evaluation protocol for project length less than 10 miles. For project lengths greater than or equal to 10 miles, add one evaluation for every additional mile.

Verify the glass bead application rate by stabbing the glass bead tank with a calibrated rod.

84-2.01D(3) Department Acceptance

The Engineer will perform a nighttime, drive-through, visual inspection of the retroreflectivity of the traffic stripes and pavement markings and notify you of any locations with deficient retroreflectivity. Test the retroreflectivity of the deficient areas to confirm striping and pavement markings meets the requirements.

The thermoplastic test stripe will be tested for yellow color, daytime luminance factor, and yellowness index requirements by METS.

84-2.02 MATERIALS

84-2.02A General

Reserved

84-2.02B Glass Beads

Each lot of glass beads must comply with EPA Test Method 3052 and 6010B or 6010C. Glass beads must contain less than 200 ppm each of arsenic and lead.

Type 1 glass beads must comply with AASHTO M 247.

Type 2 glass beads must comply with AASHTO M 247. At least 75 percent of the beads by count must be true spheres that are colorless and do not exhibit dark spots, air inclusions, or surface scratches when viewed under 20X magnification.

High-performance glass beads must be on the Authorized Material List for high-performance glass beads.

Large-gradation glass beads must be on the Authorized Material List for two component traffic paint.

Glass beads for methyl methacrylate must be on the Authorized Material List for methyl methacrylate traffic striping and pavement marking.

Glass beads for paint must comply with State Specification 8010-004.

Glass beads must be surface treated, according to the bead and the material manufacturer's instructions, to promote adhesion with the specified material.

84-2.02C Thermoplastic

Thermoplastic must comply with State Specification PTH-02HYDRO, or PTH-02ALKYD.

Sprayable thermoplastic must comply with State Specification PTH-02SPRAY.

Each lot or batch of thermoplastic must be tested under California Test 423.

84-2.02D Methyl Methacrylate

Methyl methacrylate traffic paint must:

1. Be on the Authorized Material List for methyl methacrylate traffic striping and pavement marking
2. Be Category 2

84-2.02E Traffic Striping and Pavement Marking Tape

Traffic striping and pavement marking tape must be on the Authorized Material List for signing and delineation materials.

04-19-19

White tape must have an initial retroreflectivity of a minimum 700 mcd/m².

Yellow tape must have an initial retroreflectivity of a minimum 500 mcd/m².

10-19-18

When contrast is required for traffic striping and pavement marking tape, the tape must be pre-formed and retroreflective, consisting of a white film with retroreflective beads and a contrasting black film border. The contrasting black border must be a nonreflective film bonded on each side of the white film to form a continuous roll. Each black border must be a minimum of 2 inches wide. The width of the tape must be at least 4 inches wider than the stripe width.

84-2.02F Two-Component Paint

Two-component traffic paint must be on the Authorized Material List for two component traffic paint.

84-2.02G Paint

Paint must comply with the requirements shown in following table:

Paint Specifications

Paint type	Color	Specification
Waterborne traffic line	White, yellow, and black	State Specification PTWB-01R2
Waterborne traffic line for the international symbol of accessibility and other curb markings	Blue, red, and green	Federal Specification TT-P-1952E

84-2.02H–84-2.02L Reserved

84-2.03 CONSTRUCTION

84-2.03A General

Establish the alignment for traffic stripes and the layouts for pavement markings with a device or method that will not conflict with other traffic control devices.

Protect existing retroreflective pavement markers during work activities.

Remove existing pavement markers that are coated or damaged by work activities and replace with an equivalent marker on the Authorized Material List for signing and delineation materials.

A completed traffic stripe or pavement marking must:

1. Have well defined edges
2. Be uniform
3. Be free from runs, bubbles, craters, drag marks, stretch marks, and debris

A completed traffic stripe must:

1. Be straight on a tangent alignment
2. Be a true arc on a curved alignment
3. Not deviate from the width shown by more than:
 - 3.1. 1/4 inch on a tangent alignment
 - 3.2. 1/2 inch on a curved alignment

The length of the gaps and individual stripes that form a broken traffic stripe must not deviate by more than 2 inches from the lengths shown. The gaps and stripes must be uniform throughout the entire length of the traffic stripe.

Protect newly placed traffic stripes and pavement markings from traffic and work activities until the traffic stripes and pavement markings are dry or hard enough to bear traffic.

Use mechanical methods to remove dirt, contaminants, and loose material from the pavement surface before applying the traffic stripe or pavement marking.

Use abrasive blast cleaning to remove laitance and curing compound from the surface of new concrete pavement before applying the traffic stripe or pavement marking.

Construct recesses as shown in the following table:

Recess Depth Requirements

Material	Requirement	
	Depth (mils)	Depth (in)
Thermoplastic	375	3/8
Two component traffic paint	250	1/4
Methyl methacrylate traffic paint	250	1/4

Construct recesses for double traffic stripes in a single pass.

Before applying the traffic stripes and pavement markings:

1. Allow wet ground recesses to dry a minimum of 24 hours

2. Remove all powdery residue from dry recess
3. Keep the recesses dry and free from debris

Apply traffic stripes and pavement markings before the end of the same work shift.

84-2.03B Application of Traffic Stripes and Pavement Markings

84-2.03B(1) General

Apply material for a pavement marking with a stencil or a preformed marking.

Immediately remove drips, overspray, improper markings, or material tracked by traffic, using an authorized method.

Apply a traffic stripe or a pavement marking only to a clean, dry surface during a period when the pavement surface temperature is above 50 degrees F.

Apply traffic stripe or pavement marking and glass beads in a single pass. You may apply the glass beads by hand on pavement markings.

Embed glass beads to a depth of 1/2 their diameters.

Distribute glass beads uniformly on traffic stripe and pavement markings.

Glass beads with integral color must match the color of the stripe or pavement marking.

Apply glass beads with two separate applicator guns when two gradations are specified.

Allow enough overlap distance between new and existing striping patterns to ensure continuity at the start and end of the transition.

The retroreflectivity of applied traffic stripes and pavement markings must comply with the requirements shown in the following table:

Retroreflectivity Requirements

Traffic stripe material	White (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)	Yellow (min, $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$)
Paint	250	125
Thermoplastic	250	125
Thermoplastic with wet night enhanced visibility	700	500
Two component	250	125
Methyl methacrylate	500	300
Tape	700	500

84-2.03B(2) Thermoplastic

84-2.03B(2)(a) General

Apply primer or surface preparation adhesive under the manufacturer's instructions:

1. To all roadway surfaces except for asphaltic surfaces less than 6 months old
2. At a minimum rate of 1 gallon per 300 square feet
3. To allow time for the thermoplastic primer to dry and become tacky before application of the thermoplastic

Do not thin the primer.

Preheat thermoplastic using preheaters with mixers having a 360-degree rotation.

Apply thermoplastic in a single uniform layer by spray or extrusion methods.

Completely coat and fill voids in the pavement surface with the thermoplastic.

Apply recessed thermoplastic at a thickness so that the top is 0 to 1/16 inch below the pavement surface.

84-2.03B(2)(b) Extruded Thermoplastic

Apply extruded thermoplastic at a temperature of 400 to 425 degrees F or as recommended by the manufacturer.

Apply extruded thermoplastic for a traffic stripe at a rate of at least 0.36 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied traffic stripe must be at least 0.060 inch thick.

Apply extruded thermoplastic pavement markings at a thickness from 0.100 to 0.150 inch.

Apply Type 2 glass beads to the surface of the molten thermoplastic at a rate of at least 8 lb of beads per 100 sq ft.

84-2.03B(2)(c) Sprayable Thermoplastic

Apply sprayable thermoplastic at a temperature of 350 to 400 degrees F.

Apply sprayable thermoplastic for a traffic stripe at a rate of at least 0.24 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied stripe must be at least 0.040 inch thick.

84-2.03B(2)(d) Thermoplastic with Enhanced Wet-Night Visibility

Apply a thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility in a single pass and in the following order:

1. Uniform layer of extruded thermoplastic
2. Layer of high-performance glass beads
3. Layer of Type 2 glass beads

Apply thermoplastic with enhanced wet-night visibility at a maximum speed of 8 mph.

Apply thermoplastic with enhanced wet-night visibility for a traffic stripe at a rate of at least 0.47 lb of thermoplastic per foot of 6-inch-wide solid stripe. The applied stripe must be at least 0.090 inch thick.

Apply thermoplastic with enhanced wet-night visibility for a pavement marking at a rate of at least 1.06 lb of thermoplastic per square foot of marking. The applied pavement marking must be at least 0.100 inch thick.

Apply high-performance glass beads at a rate of at least 6 lb of glass beads per 100 sq ft of stripe or marking. Apply Type 2, glass beads at a rate of at least 8 lb of glass beads per 100 sq ft of stripe or marking.

84-2.03B(3) Methyl Methacrylate

Apply the methyl methacrylate when the pavement surface and atmospheric temperatures are from 40 to 104 degrees F.

Apply methyl methacrylate paint at a minimum thickness of 0.090 inch.

Apply recessed methyl methacrylate paint at a minimum thickness of 0.200 inch.

Apply the glass beads recommended by the methyl methacrylate manufacturer.

84-2.03B(4) Traffic Striping and Pavement Marking Tape

Do not use traffic stripe and pavement marking tape on existing open graded friction course or chip seal.

Prepare pavement surface and use primer under the traffic tape manufacturer's written instructions. Apply tape to clean and dry pavement surface. Roll or tamp the traffic tape in place.

84-2.03B(5) Two-Component Paint

Apply a two-component painted traffic stripe or pavement marking in a single pass and in the following order:

1. Coat of two-component paint
2. Application of large gradation glass beads recommended by the two-component paint manufacturer
3. Application of Type 1 glass beads

Apply two-component paint when the pavement surface temperature is above 39 degrees F and the atmospheric temperature is above 36 degrees F. The temperature of the paint must comply with the paint manufacturer's instructions.

Apply two-component paint and glass beads at a maximum speed of 10 mph.

Apply large-gradation glass beads at a minimum rate of 11.7 lb of beads per gallon of paint.

Apply Type 1 glass beads at a minimum rate of 8.3 lb of beads per gallon of paint.

Apply two-component paint for the traffic stripes and pavement markings at the thickness and application rates shown in the following table:

Type of pavement	Stripe thickness (min, inch)	Application rate (min, sq ft/gal)
HMA open graded/chip seal	0.025	64
HMA dense graded	0.020	80
Concrete	0.020	80

Apply recessed two-component paint at a thickness between 0.020 and 0.025 inch.

84-2.03B(6) Paint

Do not apply paint if:

1. Fresh paint could become damaged by rain, fog, or condensation
2. Atmospheric temperature could drop below 50 degrees F during the drying period

Do not thin paint.

Use mechanical means to paint traffic stripes and pavement markings and to apply glass beads for traffic stripes.

The striping machine must be capable of superimposing successive coats of paint on the 1st coat and on existing stripes at a minimum speed of 5 mph.

Where the configuration or location of a traffic stripe is such that the use of a striping machine is not practicable, you may apply the traffic paint and glass beads by other methods and equipment if authorized.

Apply traffic stripes and pavement markings in 1 coat on existing pavement surfaces, at an approximate rate of 107 sq ft/gal.

Apply traffic stripes and pavement markings in 2 coats on a new pavement surface. The 1st coat of paint must be dry before applying the 2nd coat.

Apply 2-coat paint at the approximate rate of 215 sq ft/gal for each coat.

Paint a 1-coat, 3-inch-wide black stripe between the two 6-inch-wide yellow stripes of a double traffic stripe. If the two 6-inch-wide yellow stripes are applied in 2 coats, apply the black stripe concurrently with the 2nd coat of the yellow stripes.

On 2-lane highways:

1. If the 1st coat of the centerline stripe is applied in the same direction as increasing post miles, use the right-hand spray gun of the 3 spray guns to apply a single yellow stripe
2. If the 1st coat of the centerline stripe is applied in the same direction as decreasing post miles, use the left-hand spray gun of the 3 spray guns to apply a single yellow stripe
3. Apply the 2nd coat of centerline striping in the opposite direction of the 1st coat

Apply glass beads at an approximate rate of 5 lb of beads per gallon of paint.

Verify the application rate of paint by stabbing the paint tank with a calibrated rod. If the striping machine has paint gauges, the Engineer may measure the volume of paint using the gauges instead of stabbing the paint tank with a calibrated rod.

84-2.03B(7) Contrast Striping

04-19-19

Contrast striping consists of black striping placed on each side of a white stripe.

10-19-18

You may use permanent tape instead of paint or thermoplastic.

Apply contrast stripe paint in one coat.

Do not use glass beads or other reflective elements in contrast striping material.

04-19-19

84-2.03B(8)–84-2.03B(10) Reserved

10-19-18

84-2.04 PAYMENT

The payment quantity for a traffic stripe is the length measured along the line of the traffic stripe without deductions for gaps in the broken traffic stripe.

The payment quantity for a pavement marking is the area covered.

A double traffic stripe consisting of two 6-inch-wide yellow stripes are measured as 2 traffic stripes except for painted traffic stripes and sprayable thermoplastic traffic stripes. A double sprayable thermoplastic traffic stripe consisting of two 6-inch-wide yellow stripes are measured as single traffic stripe.

A double painted traffic stripe consisting of two 6-inch-wide yellow stripes separated by a 3-inch-wide black stripe is measured as a single traffic stripe.

The payment quantity for contrast striping is the length measured along the line of the traffic stripe without deductions for gaps in the broken traffic stripe.

Replace section 84-9 with:

10-19-18

84-9 EXISTING MARKINGS

84-9.01 GENERAL

84-9.01A Summary

Section 84-9 includes specifications for removing existing markings.

Work performed on existing markings must comply with section 15.

84-9.01B Definitions

Reserved

04-19-19

84-9.01C Submittals

10-19-18

Submit your proposed method for removing traffic stripes and pavement markings at least 7 days before starting the removal work. Allow 2 business days for the review.

84-9.02 MATERIALS

Not Used

84-9.03 CONSTRUCTION

84-9.03A General

Remove existing traffic stripes before making any changes to the traffic pattern.

CALiPER: Commercially Available LED Product Evaluation and Reporting. A U.S. Department of Energy program that individually tests and provides unbiased information on the performance of commercially available LED luminaires and lights.

controller assembly: Assembly for controlling a system's operations, consisting of a controller unit and auxiliary equipment housed in a waterproof cabinet.

controller unit: Part of the controller assembly performing the basic timing and logic functions.

correlated color temperature: Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

detector: Detector as defined in the *California MUTCD*.

electrolier: Assembly of a lighting standard and luminaire.

flasher: Device for opening and closing signal circuits at a repetitive rate.

illuminance gradient: Ratio of the minimum illuminance on a 1-foot square of sign panel to that on an adjacent 1-foot square of sign panel.

inductive loop detector: Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop. An inductive loop detector includes a loop or group of loops installed in the roadway and a lead-in cable installed and connected inside a controller cabinet.

junction temperature: Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.

L70: Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from the initial values.

lighting standard: Pole and mast arm supporting the luminaire.

link: Part of a system which provides a data connection between a transmitter and receiver.

LM-79: Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

LM-80: Test method from the Illumination Engineering Society of North America specifying the test conditions, measurements, and report format for testing and estimating the long-term performance of LEDs for general lighting purposes.

luminaire: Assembly that houses the light source and controls the light emitted from the light source.

mid-span access method: Procedure in which fibers from a single buffer tube are accessed and spliced to a multi buffer tube cable without cutting the unused fibers in the buffer tube, or disturbing the remaining buffer tubes in the cable.

National Voluntary Laboratory Accreditation Program: U.S. Department of Energy program that accredits independent testing laboratories.

optical time domain reflectometer: Fiber optic test equipment that is used to measure the total amount of power loss between two points and over the corresponding distance. It provides a visual and printed display of the relative location of system components such as fiber sections, splices and connectors as well as the losses that are attributed to each component and or defects in the fiber.

pedestrian change interval: Pedestrian change interval as defined in the *California MUTCD*.

powder coating: Coating applied electrostatically using exterior-grade, UV-stable, polymer powder.

power factor: Ratio of the real power component to the complex power component.

power meter: Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. Its display indicates the amount of power injected by the light

source at the designed wavelength of the system under testing that arrives at the receiving end of the link.

pretimed controller assembly: Assembly operating traffic signals under a predetermined cycle length.

programming mechanism: Device to program the accessible pedestrian signal operation.

pull box: Box with a cover that is installed in an accessible place in a conduit run to facilitate the pulling in of wires or cables.

push button information message: Push button information message as defined in the *California MUTCD*.

push button locator tone: Push button locator tone as defined in the *California MUTCD*.

segment: Continuous cable terminated by 2 splices, 2 connectors or 1 splice and 1 connector.

signal face: Signal face as defined in the *California MUTCD*.

signal head: Signal head as defined in the *California MUTCD*.

signal indication: Signal indication as defined in the *California MUTCD*.

signal section: Signal section as defined in the *California MUTCD*.

signal standard: Pole with or without mast arms carrying 1 or more signal faces.

street side lumens: Lumens from a luminaire directed to light up areas between the fixture and the roadway, such as traveled ways and freeway lanes.

surge protection device: Subsystem or component that protects equipment against short-duration voltage transients in power line.

total harmonic distortion: Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

traffic-actuated controller assembly: Assembly for operating traffic signals under the varying demands of traffic as registered by detector actuation.

traffic phase: Traffic phase as defined in the *California MUTCD*.

vehicle: Vehicle as defined in the *California Vehicle Code*.

vibrotactile pedestrian device: Vibrotactile pedestrian device as defined in the *California MUTCD*.

10-19-18

Delete the 9th and 10th paragraphs of section 86-1.01C(1).

Replace section 86-1.01C(3) with:

10-19-18

86-1.01C(3) Luminaires

Submit for a luminaire:

1. Maximum power in watts
2. Maximum designed junction temperature
3. Heat sink area in square inches
4. Designed junction-to-ambient thermal resistance calculation with thermal resistance components clearly defined
5. L70 in hours when extrapolated for the average nighttime operating temperature
6. Life expectancy based on the junction temperature
7. Manufacturer's data sheet for the power supply, including the rated life

Submit the manufacturer's QC test data for luminaires as an informational submittal.

Replace section 86-1.01C(4) with:

10-19-18

86-1.01C(4) Reserved

Replace the 3rd paragraph of section 86-1.02B(1) with:

04-19-19

Conduit used for horizontal directional drilling must be high density polyethylene Type IPS, SDR 9 and comply with ASTM F2160.

Replace the 8th paragraph of section 86-1.02B(1) with:

10-19-18

High density polyethylene for innerduct must:

1. Comply with ASTM D3485, D3035, D2239, and D2447, and NEMA TC7 and TC2
2. Have a minimum tensile yield strength of 3300 psi under ASTM D638
3. Have a density of $59.6187 \text{ lb/ft}^3 \pm 0.3121 \text{ lb/ft}^3$ under ASTM D1505

04-19-19

Replace the 9th paragraph of section 86-1.02B(1) with:

04-19-19

Tracer wire must be a minimum no. 12 solid copper conductor with orange insulation Type TW, THW, RHW, or USE. For direct burial, the tracer wire insulation must be Type UF.

Replace the 4th paragraph of section 86-1.02C(1) with:

10-19-18

The cover marking must include CALTRANS and one of the following:

1. *SERVICE* for service circuits between a service point and service disconnect
2. *SERVICE IRRIGATION* for circuits from a service equipment enclosure to an irrigation controller
3. *SERVICE BOOSTER PUMP* for circuits from a service equipment enclosure to the booster pump
4. *TDC POWER* for circuits from a service equipment enclosure to telephone demarcation cabinet
5. *LIGHTING* for a lighting system
6. *SIGN ILLUMINATION* for a sign illumination system
7. *SIGNAL AND LIGHTING* for a signal and lighting system
8. *RAMP METER* for a ramp metering system
9. *TMS* for a traffic monitoring station
10. *FLASHING BEACON* for a flashing beacon system
11. *CMS* for a changeable message sign system
12. *INTERCONNECT* for an interconnect conduit and cable system
13. *FIBER OPTIC* for fiber optic cable system
14. *ELECTRICAL SYSTEMS* if more than one system is shared in the same pull box

10-19-18

Delete the 3rd paragraph of section 86-1.02C(2).

Replace the 1st and 2nd paragraphs of section 86-1.02C(3) with:

10-19-18

A traffic pull box and cover must comply with AASHTO HS20-44 and load tested under AASHTO M 306.

The frame must be anchored to the box with 2-1/4-inch-long concrete anchors with a 1/4 inch diameter. A no. 3-1/2(T) pull box must have 4 concrete anchors, one placed in each corner. No. 5(T) and no. 6(T) pull boxes must have 6 concrete anchors, one placed in each corner and one near the middle of each of the longer sides.

Replace section 86-1.02C(4)(b) with:

10-19-18

86-1.02C(4)(b) Tamper-Resistant Nontraffic Pull Box

86-1.02C(4)(b)(i) General

A tamper resistant nontraffic pull box must include a pull box with one of the following:

1. Anchored cover
2. Lockable cover
3. Pull box insert

86-1.02C(4)(b)(ii) Anchored Cover

The anchored cover must:

1. Be of 1/2-inch-thick mild steel, hot dip galvanized, post fabrication.
2. Be hot dip galvanized after manufacturing with spikes removed from the galvanized surfaces.
3. Have a center space for a top lock nut that must be torqued to 200 ft-lb.
4. Have a center opening for a stainless steel threaded cap to cover the lock nut.
5. Weigh a minimum of 85 lb.
6. Include an all-around security skirt of 1/4-inch thick steel. The skirt must be sized to encase a nontraffic pull box or sized to fit within a traffic pull box.
7. Be welded to the skirt.

86-1.02C(4)(b)(iii) Lockable Cover

The lockable cover must:

1. Be manufactured from minimum 3/16-inch-thick galvanized steel or a polymer of minimum strength equal to 3/16 inch steel.
2. Be secured to the pull box with a locking mechanism of equal or greater strength than the manufactured material.
3. Have 1/2-by-2-inch slot holes for lifting.
4. Have dimensions complying with one of the following:
 - 4.1. Department's standards for pull box covers as shown if the lockable cover is secured to the inside lip of the pull box.
 - 4.2. Department's standards for the length and width as shown for pull box covers if the lockable cover is secured to the top of the pull box.

86-1.02C(4)(b)(iv) Pull Box Insert

The pull box insert must:

1. Be made of minimum 3/16-inch-thick or 10 gauge mild hot-dipped galvanized steel
2. Have a minimum of 2 mounting brackets that rest under the side or end wall
3. Be lockable with a padlock having a minimum 3/8-inch shackle
4. Have dimensions complying with the Department's standards for the length and width as shown for pull box covers

Delete section 86-1.02C(4)(d).

10-19-18

Delete section 86-1.02C(4)(e).

10-19-18

Delete section 86-1.02C(4)(f).

10-19-18

Replace section 86-1.02D(3) with:

10-19-18

86-1.02D(3) Warning Tape

Warning tape must be orange color polyolefin film, minimum elongation of 500 percent before breakage, water and corrosion resistant, and comply with requirements shown in the following table:

Warning Tape Requirements

Quality characteristic	Requirement
Thickness (min, mil)	4
Width (in)	4
Tensile strength of material (min, psi)	2800
Message spacing intervals (ft)	3

The warning tape must have a printed message that reads: CAUTION: CALTRANS FACILITIES BELOW.

The printed text height and color must be 1 inch, black color text over bright orange background.

Replace the 2nd paragraph of section 86-1.02E with:

10-19-18

Each sensor must:

1. Have a dissipation factor less than 0.04 nF when measured in the 20 nF range
2. Have resistance greater than 20 Megaohms
3. Be 1/4 inch wide by 6 feet long by 1/16 inch thick
4. Have a RG-58C/U coaxial screen transmission cable, jacketed with high-density polyethylene, rated for direct burial and resistant to nicks and cuts
5. Operate over a temperature range from -40 to 160 degrees F
6. Have a signal to noise ratio equal to or greater than 10 to 1
7. Have an output signal of a minimum 250 mV \pm 20 percent for a wheel load of 400 lb at 55 mph and 70 degrees F
8. Have an insulation resistance greater than 500 M Ω
9. Have a life cycle of a minimum 25 million equivalent single axle loadings

Replace section 86-1.02F(1) with:

10-19-18

86-1.02F(1) General

Conductors and cables must be clearly and permanently marked the entire length of their outer surface with:

1. Manufacturer's name or trademark
2. Insulation-type letter designation

3. Conductor size
4. Voltage
5. Number of conductors for a cable

The minimum insulation thickness and color code requirements must comply with NEC.

Replace the 2nd paragraph of section 86-1.02F(2)(a) with:

10-19-18

Conductors must be identified as shown in the following table:

Conductor Identification

Circuit	Signal phase or function	Identification		Band symbols	Copper size
		Insulation color			
		Base	Stripe ^a		

Signals (vehicle) ^{a,b}	2, 6	Red, yellow, brown	Black	2, 6	14
	4, 8	Red, yellow, brown	Orange	4, 8	14
	1, 5	Red, yellow, brown	None	1, 5	14
	3, 7	Red, yellow, brown	Purple	3, 7	14
	Ramp meter 1	Red, yellow, brown	None	No band required	14
	Ramp meter 2	Red, yellow, brown	Black	No band required	14
Pedestrian signals	2p, 6p	Red, brown	Black	2p, 6p	14
	4p, 8p	Red, brown	Orange	4p, 8p	14
	1p, 5p	Red, brown	None	1p, 5p	14
	3p, 7p	Red, brown	Purple	3p, 7p	14
Push button assembly or accessible pedestrian signal	2p, 6p	Blue	Black	P-2, P-6	14
	4p, 8p	Blue	Orange	P-4, P-8	14
	1p, 5p	Blue	None	P-1, P-5	14
	3p, 7p	Blue	Purple	P-3, P-7	14
Traffic signal controller cabinet	Ungrounded circuit conductor	Black	None	CON-1	6
	Grounded circuit conductor	White	None	CON-2	6
Highway lighting pull box to luminaire	Ungrounded - line 1	Black	None	No band required	14
	Ungrounded - line 2	Red	None	No band required	14
	Grounded	White	None	No band required	14
Multiple highway lighting	Ungrounded - line 1	Black	None	ML1	10
	Ungrounded - line 2	Red	None	ML2	10
	Ungrounded - line 3	White	None	ML3	10
Lighting control	Ungrounded - Photoelectric unit	Black	None	C1	14
	Switching leg from Photoelectric unit or SM transformer	Red	None	C2	14
Service	Ungrounded - line 1 (signals)	Black	None	No band required	6
	Ungrounded - line 2 (lighting)	Red	None	No band required	8
Sign lighting	Ungrounded - line 1	Black	None	SL-1	10
	Ungrounded - line 2	Red	None	SL-2	10
Flashing beacons	Ungrounded between flasher and beacons	Red or yellow	None	FB-Location. ^c	14
Grounded circuit conductor	Push button assembly or accessible pedestrian signal	White	Black	No band required	14
	Signals and multiple lighting	White	None	No band required	10
	Flashing beacons and sign lighting	White	None	No band required	12
	Lighting control	White	None	C-3	14

	Service	White	None	No band required	14
Railroad preemption		Black	None	R	14
Spares		Black	None	No band required	14

Notes:

^aOn overlaps, the insulation is striped for the 1st phase in the designation, e.g., phase (2+3) conductor is striped as for phase 2.

^bBand for overlap and special phases as required

^cFlashing beacons having separate service do not require banding.

10-19-18

Delete the 4th paragraph of section 86-1.02F(2)(a).

Replace the 2nd paragraph of section 86-1.02F(2)(c)(ii) with:

10-19-18

An equipment grounding conductor must be insulated.

Replace the 3rd paragraph of section 86-1.02F(3)(d)(ii) with:

10-19-18

Cable must comply with the requirements shown in the following table:

Cable type	Conductor quantity and type	Cable jacket thickness (mils)		Maximum nominal outside diameter (inch)	Conductor color code
		Average	Minimum		

3CSC	3 no. 14	44	36	0.40	Blue/black stripe, blue/orange stripe, white/black stripe
5CSC	5 no. 14	44	36	0.50	Red, yellow, brown, black, white
9CSC	1 no. 12 8 no. 14	60	48	0.65	No. 12 - white, No. 14 - red, yellow, brown, black, red/black stripe, yellow/black stripe, brown/black stripe, white/black stripe
12CSC	1 no. 12 11 no. 14	60	48	0.80	No. 12 - white No. 14 - red, yellow, brown, black, red/black stripe, yellow/black stripe, brown/black stripe, black/red stripe, black/white stripe, red/white stripe, brown/white stripe
28CSC	1 no. 10 27 no. 14	80	64	0.90	No. 10 - white No. 14 - red/black stripe, yellow/black stripe, brown/black stripe, red/orange stripe, yellow/orange stripe, brown/orange stripe, red/silver stripe, yellow/silver stripe, brown/silver stripe, red/purple stripe, yellow/purple stripe, brown/purple stripe, red/2 black stripes, brown/2 black stripes, red/2 orange stripes, brown/2 orange stripes, red/2 silver stripes, brown/2 silver stripes, red/2 purple stripes, brown/2 purple stripes, blue/black stripe, blue/orange stripe, blue/silver stripe, blue/purple stripe, white/black stripe, black/red stripe, black

Replace the 3rd paragraph of section 86-1.02G with:

10-19-18

The self-adhesive reflective labels must:

1. Be from 3 to 5 mils thick
2. Have all black capital characters on a white background
3. Extend beyond the character by a minimum of 1/4 inch

Replace the 4th paragraph of section 86-1.02H with:

10-19-18

PVC electrical tape must have a minimum thickness of 6 mils.

Replace section 86-1.02K with:

10-19-18

86-1.02K Luminaires

86-1.02K(1) General

A luminaire must:

1. Be self-contained, not requiring assembly.
2. Comply with UL 1598 for luminaires in wet locations.
3. Have a power supply with ANSI/IEC rating of at least IP65.
4. Weigh less than 35 lb.
5. Have a minimum operating life of 100,000 hours when operated for an average time of 11.5 hours at an average temperature of 70 degrees F.
6. Operate over a temperature range from -40 to 130 degrees F.
7. Be operationally compatible with photoelectric controls.
8. Have a correlated color temperature range from 2700 to 3500 K and a color rendering index of 70 or greater.
9. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end.
10. Comply with California Test 611.
11. Have a power factor of 0.90 or greater. The total harmonic distortion, current, and voltage induced into a power line by a luminaire must not exceed 20 percent.
12. Comply with the maximum power consumption and isofootcandle curves as shown.
13. Be on the Authorized Material List for LED luminaires or must be submitted for testing and addition to the AML.

A luminaire must include a surge protection device to withstand high-repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The device must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The surge protection device must comply with UL 1449 and ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

The luminaire must operate over the entire voltage range from 120 to 480 V(ac), 60 ± 3 Hz or one of the following:

1. From 95 to 277 V(ac) for luminaires rated 120 V(ac) or 240 V(ac)
2. From 347 to 480 V(ac) for luminaires rated 480 V(ac)

The fluctuations of line voltage must have no visible effect on the luminous output.

The L70 of the luminaire must be the minimum operating life or greater. Illuminance measurements must be calibrated to standard photopic calibrations.

The luminaire's housing must withstand a 1008 hour cyclic salt fog spray/UV test under ASTM D5894 and an evaluation under ASTM D714 with a blister size of 8 or greater and no more than medium density.

The luminaire's housing must be marine-grade alloy with less than 0.2 percent copper or die cast aluminum. All exposed aluminum must be anodized. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

External bolts, screws, hinges, hinge pins, and door closure devices must be corrosion resistant.

The housing must be designed to prevent the buildup of water on its top surface. Exposed heat sink fins must be oriented to allow water to run off the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an UL 60529 rating of IP66. The power supply enclosure must be protected to at least an UL 60529 rating of IP43.

If the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire's housing separately from other components. The door must be secured to the housing to prevent accidental opening. A safety cable must mechanically connect the door to the housing.

A luminaire must have a barrier-type terminal block secured to the housing to connect field wires. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6.

The conductors and terminals must be identified and marked.

If needed, each refractor or lens must be made of UV-inhibiting high-impact plastic, such as acrylic or polycarbonate, or heat and impact-resistant glass. The refractor or lens must be resistant to scratching. Polymeric materials, except for the lenses of enclosures containing either the power supply or electronic components of the luminaire, must be made of UL94 V-0 flame-retardant materials.

The luminaire must be permanently marked inside the unit and outside of its packaging box. Marking consists of:

1. Manufacturer's name or trademark
2. Month and year of manufacture
3. Model, serial, and lot numbers
4. Rated voltage, wattage, and power in VA

An LED luminaire must:

1. Comply with Class A emission limits under 47 CFR 15(B) for the emission of electronic noise.
2. Have a power supply with:
 - 2.1. 2 leads to accept standard 0-10 V(dc).
 - 2.2. Dimming control compatible with IEC 60929, Annex E. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.
 - 2.3. Case temperature self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.
3. Have passive thermal management with enough capacity to ensure proper heat dissipation and functioning of the luminaire over its minimum operating life. The maximum junction temperature for the minimum operating life must not exceed 221 degrees F.
4. Have a junction-to-ambient thermal resistance of 95 degrees F per watt or less.
5. Contain circuitry that automatically reduces the power to the LEDs so the maximum junction temperature is not exceeded when the ambient temperature is 100 degrees F or greater.
6. Have a heat sink made of aluminum or other material of equal or lower thermal resistance. The use of fans or other mechanical devices is not allowed for cooling the luminaire.

The catastrophic loss or failure of 1 LED must not result in the loss of more than 20 percent of the total luminous output of the LED luminaire.

86-1.02K(2) Roadway luminaires

A roadway luminaire must:

1. Have a housing color that matches a color no. 26152 to 26440, 36231 to 36375, or 36440 of AMS-STD-595
2. Have an ANSI C136.41-compliant, locking-type, photocontrol receptacle with dimming connections and a watertight shorting cap
3. Not allow more than 2.5 percent of the rated lumens to project above 80 degrees measured up from the vertical plane in the direction of the roadway
4. Have equipment identification character labels outside the unit on the side that will face the road. Equipment identification characters consist of:
 - 4.1. R1 for Roadway 1, R2 for Roadway 2, R3 for Roadway 3, and R4 for Roadway 4
 - 4.2. Rated wattage

The luminaire's housing must have a slip fitter that must:

1. Fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches
2. Be adjustable to a minimum of ± 5 degrees from the axis of the tenon in a minimum of 5 steps: +5, +2.5, 0, -2.5, -5
3. Have clamping brackets that:
 - 3.1. Are made of corrosion-resistant materials or treated to prevent galvanic reactions
 - 3.2. Do not bottom out on the housing bosses when adjusted within the designed angular range
 - 3.3. Do not permanently set in excess of 1/32 inch when tightened

86-1.02K(3) Overhead Sign Luminaires

An overhead sign luminaire must:

1. Have a uniformity average to minimum ratio of 10:1 for the distribution of light reflected on a 16' wide by 10' high sign panel
2. Not allow more than 2.5 percent of the rated lumens to project above 65 degrees measured up from the horizontal plane in the direction of the sign panel
3. Mount at a maximum height of 12 inches above the top of the mounting rails
4. Mount directly to the sign structure as shown or with a mounting adapter that meets the material requirements of the luminaire's housing

Replace section 86-1.02M with:

10-19-18

86-1.02M Photoelectric Controls

Photoelectric control types are as shown in the following table:

Photoelectric Control Types

Control type	Description
I	Pole-mounted photoelectric unit. Test switch and a 15-A circuit breaker per ungrounded conductor, housed in an enclosure.
II	Pole-mounted photoelectric unit. Contactor, a 15-A circuit breaker per ungrounded conductor, and test switch located in a service equipment enclosure.
III	Pole-mounted photoelectric unit. Contactor, a 15-A circuit breaker per ungrounded conductor, and a test switch housed in an enclosure.
IV	A photoelectric unit that plugs into a NEMA twist-lock receptacle, integral with the luminaire.
V	A photoelectric unit, contactor, a 15-A circuit breaker per ungrounded conductor, and test switch located in a service equipment enclosure.

The pole-mounted adaptor for Type I, II, and III photoelectric controls must include a terminal block and cable supports or clamps to support the wires.

Photoelectric unit must:

1. Have a screen to prevent artificial light from causing cycling.
2. Have a rating of 60 Hz, 105-130 V(ac), 210-240 V(ac), or 105-240 V(ac).

3. Operate at a temperature range from -20 to 55 degrees C.
4. Consume less than 10 W.
5. Be a 3-prong, twist-lock type with a NEMA IP 65 rating, ANSI C136.10-compliant.
6. Have a fail-on state.
7. Fit into a NEMA-type receptacle.
8. Turn on from 1 to 5 footcandles and turn off from 1.5 to 5 times the turn-on level. Measurements must be made by procedures in *EEI-NEMA Standards for Physical and Electrical Interchangeability of Light-Sensitive Control Devices Used in the Control of Roadway Lighting*.

Type I, II, III, and V photoelectric controls must have a test switch to allow manual operation of the lighting circuit. Switch must be:

1. Single-hole mounting, toggle type
2. 15 A, single pole and single throw
3. Labeled *Auto-Test* on a nameplate

Photoelectric control's contactor must be:

1. Normally open
2. Mechanical-armature type with contacts of fine silver, silver alloy, or equal or better material
3. Installed to provide a minimum space of 2-1/2 inches between the contactor terminals and the enclosure's sides

The terminal blocks must be rated at 25 A, 600 V(ac), molded from phenolic or nylon material, and be the barrier type with plated-brass screw terminals and integral marking strips.

Replace section 86-1.02N with:

10-19-18

86-1.02N Fused Splice Connectors

The fused splice connector for 240 and 480 V(ac) circuits must simultaneously disconnect both ungrounded conductors. The connector must not have exposed metal parts except for the head of the stainless steel assembly screw. The head of the assembly screw must be recessed a minimum of 1/32 inch below the top of the plastic boss that surrounds the head.

The connector must protect the fuse from water or weather damage. Contact between the fuse and fuse holder must be spring loaded.

Fuses must:

1. Be standard, midget, ferrule type
2. Have a nontime-delay feature
3. Be 13/32 by 1-1/2 inches

Fuse ratings for luminaires are shown in the following table:

Fuse Current Rating Requirements		
Circuit voltage	Fuse voltage rating	Soffit and roadway luminaires
120 V(ac)	250 V(ac)	5 A
240 V(ac)	250 V(ac)	5 A
480 V(ac)	500-600 V(ac)	5 A

Fuse ratings for transformers are shown in the following table:

Fuse Current Rating Requirements

Circuit voltage	Fuse voltage rating	Fuse current rating for		
		Single phase (two wires)	Transformers	(primary side)
		1 kVA	2 kVA	3 kVA
120 V(ac)	250 V(ac)	10 A	20 A	30 A
240 V(ac)	250 V(ac)	6 A	10 A	20 A
480 V(ac)	500-600 V(ac)	3 A	6 A	10 A

Replace section 86-1.02P(1) with:

10-19-18

86-1.02P(1) General

The enclosures must be rated NEMA 3R and include a dead front panel and a hasp with a 7/16-inch-diameter hole for a padlock.

Except for a service equipment enclosure, an enclosure must:

1. Be manufactured from steel and either galvanized, cadmium plated, or powder coated
2. Mount to a standard, pole, post, or sign structural frame
3. Provide a minimum space of 2-1/2 inches between the internal components and the enclosure's sides

The enclosure's machine screws and bolts must not protrude outside the cabinet wall.

The fasteners on the exterior of an enclosure must be vandal resistant and not be removable. The exterior screws, nuts, bolts, and washers must be stainless steel.

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

04-19-19

Service equipment enclosure must:

1. Comply with the Electric Utility Service Equipment Requirements Committee
2. Meet the requirements of the service utility
3. Be watertight
4. Be factory wired and manufactured from steel and galvanized or have factory-applied, rust-resistant prime and finish coats, except Types II and III
5. Be marked as specified in NEC to warn of potential electric-arc flash hazards

04-19-19

Delete the 5th paragraph of 86-1.02P(2).

Add between 6th and 7th paragraphs of section 86-1.02P(2):

10-19-18

Service equipment enclosure must have the meter view windows located on the front side of the enclosure for Types III-AF, BF, CF and DF.

Service equipment enclosure must have the meter view windows located on the back side of the enclosure for Types III-AR, BR, CR and DR.

Replace the 7th paragraph of section 86-1.02P(2) with:

04-19-19

The meter area must have a sealable, lockable, weather-tight cover that can be removed without the use of tools.

Delete the 2nd sentence of the 9th paragraph of section 86-1.02P(2).

04-19-19

Delete section 86-1.02P(3).

10-19-18

Replace section 86-1.02Q(4)(a) with:

10-19-18

86-1.02Q(4)(a) General

The doors of a telephone demarcation cabinet must be attached using continuous aluminum steel piano hinges.

Add between the 2nd and 3rd paragraphs of section 86-1.02R(2):

10-19-18

Bracket arms must be long enough to allow proper alignment of signals and backplate installation.

Replace item 2 in the list in the 5th paragraph of section 86-1.02R(4)(a)(iii) with:

10-19-18

2. Be a black color throughout, including the door, matching color no. 17038, 27038, or 37038 of AMS-STD-595

Add to the beginning of section 86-1.02T:

04-19-19

Accessible pedestrian signal must be on the Authorized Material List for Accessible Pedestrian Signals.

Replace the 5th and 6th paragraphs of section 86-1.02T with:

10-19-18

The color of a metallic housing must match color no. 33538 of AMS-STD-595.

The color of a plastic housing must match color no. 17038, 27038, or 37038 of AMS-STD-595.

Replace the 7th paragraph of section 86-1.02T with:

04-19-19

Accessible pedestrian signal must:

1. Have controllable and programmable volume level and messaging
2. Be weatherproof and shockproof

Replace the 11th paragraph of section 86-1.02T with:

10-19-18

The cable between the accessible pedestrian signal assembly and the pedestrian signal head must be rated for outdoor use and have a:

1. Minimum four no. 18 stranded or larger tinned copper conductors with a minimum insulation thickness of 15 mils
2. Cable jacket with a minimum thickness of 20 mils and rated for a minimum:
 - 2.1. 300 V(ac)

1. Conduit
2. Pull boxes
3. Cabinets
4. Service equipment enclosures
5. Standards

The digital file must consist of:

1. Longitudinal and latitude coordinates, under the WGS84 reference coordinate system. The coordinates must be in decimal format having 6 significant figures after the decimal point. Coordinates must be read at the center of pull boxes, cabinet, standards, and service equipment enclosures; and on top of conduit at 20-foot intervals before backfill.
2. Type, depth and size for conduits.
3. Type for pull boxes, standards, cabinets, and service equipment enclosures.

Replace item 4 in the list in the 1st paragraph of section 87-1.01D(2)(a) with:

4. Luminaires

10-19-18

Replace section 87-1.01D(2)(d) with:

10-19-18

87-1.01D(2)(d) Piezoelectric Axle Sensors

Piezoelectric axle sensors test consists of:

1. Demonstrating for each sensor:
 - 1.1. Capacitance is within 20 percent of the value shown on the sensor's data sheet
 - 1.2. Dissipation factor is less than 0.04 nF when measured in the 20 nF range
 - 1.3. Resistance is greater than 20 Megaohms
2. Collecting a minimum of 100 vehicle records for each lane and demonstrating:
 - 2.1. Volume is within ± 3 percent accuracy
 - 2.2. Vehicle classification is within 95 percent accuracy by type

Replace the 7th paragraph of section 87-1.03A with:

10-19-18

Notify the Engineer immediately if an existing facility is damaged by your activities:

1. Damaged existing traffic signal systems must be repaired or replaced within 24 hours. If the system cannot be fixed within 24 hours or it is located on a structure, provide a temporary system until the system can be fixed.
2. Damaged existing lighting systems must be repaired or replaced by nightfall. If the system cannot be fixed by nightfall, provide a temporary system until the system can be fixed.

Add to the end of section 87-1.03A:

10-19-18

Collect the geographic information system mapping data.

Replace the 12th paragraph of section 87-1.03B(1) with:

10-19-18

For Type 1, 2, and 5 conduits, use threaded bushings and bond them using a jumper. For other types of conduit, use nonmetallic bushings or end bell.

Replace the 3rd paragraph of section 87-1.03B(3)(a) with:

10-19-18

Place a minimum of 2 inches of sand bedding in a trench before installing the conduit and 18 inches of slurry cement over the conduit before placing additional backfill material.

The slurry must be pigmented to match AMS-STD-595.

Replace the 1st sentence in the 6th paragraph of section 87-1.03B(3)(c) with:

10-19-18

Backfill trench with slurry concrete under section 19-3.02E.

Replace the 9th paragraph of section 87-1.03B(3)(c) with:

10-19-18

Install innerducts as one continuous unit between vaults. Innerducts may be interrupted inside pull boxes located between vaults and cabinets.

Replace section 87-1.03D with:

10-19-18

87-1.03D Reserved

Replace section 87-1.03E(2) with:

04-19-19

Dig a trench for the electrical conduits or direct burial cables. Do not excavate until the installation of the conduit or direct burial cables.

Place excavated material in a location that will not interfere with traffic or surface drainage.

After placing the conduit or direct burial cable, backfill the trench.

Compact the backfill to a minimum relative compaction of:

1. 95 percent when placed within the hinge points and in areas where pavement is to be constructed
2. 90 percent when placed outside the hinge points and not under pavement

Restore the sidewalks, pavement, and landscaping at a location before starting excavation at another location.

Replace section 87-1.03E(3) with:

10-19-18

87-1.03E(3) Concrete Pads, Foundations, and Pedestals

Construct foundations for standards, poles, metal pedestals, and posts under section 56-3.

Construct concrete pads, foundations, and pedestals for controller cabinets, telephone demarcation cabinets, and service equipment enclosures on firm ground.

Install anchor bolts using a template to provide proper spacing and alignment. Moisten the forms and ground before placing the concrete. Keep the forms in place until the concrete sets for at least 24 hours to prevent damage to the surface.

Use minor concrete for pads, foundations, and pedestals.

Construct a pad in front of a Type III service equipment enclosure. The pad must be 24 inches in length, 4 inches in thickness, and must match the width of the foundation.

In unpaved areas, place the top of the foundation 6 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. 2 inches above the grade for Type III service equipment enclosures

The pad must be 2 inches above the surrounding grade in unpaved areas.

In and adjacent to the sidewalk and other paved areas, place the top of the foundation 4 inches above the surrounding grade, except place the top:

1. 1 foot 6 inches above the grade for 336L cabinets
2. 1 foot 8 inches above the grade for Type C telephone demarcation cabinets
3. Level with the finished grade for Type G and Type A cabinets and Type III service equipment enclosures

The pad must be level with the finished grade in paved areas.

Apply an ordinary surface finish under section 51-1.03F.

Allow the foundation to cure for at least 7 days before installing any equipment.

Replace the last paragraph of section 87-1.03F(1) with:

Install a tracer wire.

04-19-19

Replace the 1st paragraph of section 87-1.03F(3)(c)(ii) with:

Install a Type 1 or 2 inductive loop conductor except use Type 2 for Type E and F loop detectors.

10-19-18

Delete the last paragraph of section 87-1.03G.

10-19-18

Replace the 4th paragraph of section 87-1.03H(2) with:

Use Method B as follows:

1. Cover the splice area completely with an electrical insulating coating and allow it to dry.
2. Apply 3 layers of half-lapped, PVC electrical tape.
3. Apply 2 layers of butyl-rubber, stretchable tape with liner.
4. Apply 3 layers of half-lapped, PVC, pressure-sensitive, adhesive tape.
5. Cover the entire splice with an electrical insulating coating and allow it to dry.

10-19-18

Replace section 87-1.03N with:

87-1.03N Fused Splice Connectors

Install a fuse splice connector with a fuse in each ungrounded conductor for luminaires, except for overhead sign luminaires. The connector must be located in the pull box adjacent to the luminaires.

10-19-18

If the pull box for the roadway luminaire is tamper resistant, install a fuse splice connector with 10 A fuse in the pull box and an additional fuse splice connector with a 5 A fuse in the handhole.

Install a fuse splice connector with a fuse on primary side of transformer.

Crimp the connector terminals onto the ungrounded conductors using a tool under the manufacturer's instructions. Insulate the terminals and make them watertight.

Add to the end of section 87-1.03T:

10-19-18

When replacing an existing accessible pedestrian signal, the housing color must match the color of the existing housing.

Add to the end of section 87-1.03U:

10-19-18

When replacing an existing push button assembly, the housing color must match the color of the existing housing.

Add between the 1st and 2nd paragraphs of section 87-1.03Y:

04-19-19

Use a submersible type transformer inside pull boxes.

Replace the 2nd paragraph of section 87-2.03A with:

10-19-18

Tighten the cap screws of the luminaire's clamping bracket to 10 ft-lb for roadway luminaires.

Replace section 87-3 with:

10-19-18

87-3 SIGN ILLUMINATION SYSTEMS

87-3.01 GENERAL

Section 87-3 includes specifications for constructing sign illumination systems.

Sign illumination system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors
5. Overhead sign luminaires
6. Service equipment enclosure
7. Photoelectric control

The components of a sign illumination system are shown on the project plans.

87-3.02 MATERIALS

Reserved

87-3.03 CONSTRUCTION

Perform the conductor test.

Install overhead sign luminaires under the manufacturer's instructions.

Do not modify the sign structure or mounting channels.

Perform the operational tests for the system.

87-3.04 PAYMENT

Not Used

Replace section 87-4.01D with:

10-19-18

87-4.01D Quality Assurance

Reserved

Replace section 87-4.02B with:

10-19-18

87-4.02B Battery Backup System

A battery backup system includes the cabinet, batteries, and the Department-furnished electronics assembly.

The electronics assembly includes the inverter/charger unit, power transfer relay, manually-operated bypass switch, battery harness, utility interconnect wires, battery temperature probe, and relay contact wires.

Replace the 2nd sentence in the 15th paragraph of section 87-4.02C with:

10-19-18

The background must comply with color no. 14109 of AMS-STD-595.

Replace section 87-4.03B with:

10-19-18

87-4.03B Battery Backup System Cabinets

Install the battery backup system cabinet to the right of the controller cabinet.

If installation on the right side is not possible, obtain authorization for installation on the left side.

Provide access for power conductors between the cabinets using:

1. 2-inch nylon-insulated, steel chase nipple
2. 2-inch steel sealing locknut
3. 2-inch nylon-insulated, steel bushing

Remove the jumper between the terminals labeled *BBS-1* and *BBS-2* in the 5 position terminal block in the controller cabinet before connecting the Department-furnished electronics assembly.

Replace section 87-7.02 with:

10-19-18

87-7.02 MATERIALS

Flashing beacon control assembly includes:

1. Enclosure.
2. Barrier-type terminal blocks rated for 25 A, 600 V(ac), made of molded phenolic or nylon material and have plated-brass screw terminals and integral marking strips.
3. Solid state flasher complying with section 8 of NEMA standards publication no. TS 1 for 10 A, dual circuits.

4. 15-A, circuit breaker per ungrounded conductor.
5. Single-hole-mounting toggle type, single-pole, single-throw switches rated at 12-A, 120 V(ac). Switches must be furnished with an indicating nameplate reading *Auto - Test*. A 15-A circuit breaker may be used in place of the toggle switch.

Replace 87-8 with:

10-19-18

87-8 PEDESTRIAN HYBRID BEACON SYSTEMS

87-8.01 GENERAL

87-8.01A Summary

Section 87-8 includes specifications for constructing pedestrian hybrid beacon system.

A pedestrian hybrid beacon system includes:

1. Foundations
2. Pull boxes
3. Conduit
4. Conductors and cables
5. Standards
6. Pedestrian hybrid beacon face
7. Pedestrian signal heads
8. Service equipment enclosure
9. Department-furnished controller assembly
10. Accessible pedestrian signals
11. Push button assemblies
12. Luminaires
13. Fuse splice connectors
14. Battery backup system

The components of a pedestrian hybrid beacon system are shown on the project plans.

87-8.01B Definitions

Reserved

87-8.01C Submittals

Reserved

87-8.01D Quality Assurance

87-8.01D(1) General

Reserved

87-8.01D(2) Quality Control

Verify the sequence for the pedestrian hybrid beacon system per California Chapter 4F, Figure 3F-3 "Sequence for a Pedestrian Hybrid Beacon" during the operational test.

Test the battery backup system under section 87-1.01D(2)(c).

87-8.02 MATERIALS

87-8.02A General

The system must comply with California *MUTCD*, Chapter 4F.

The battery backup system must comply with section 87-4.02B.

87-8.02B Pedestrian Hybrid Beacon Face

A pedestrian hybrid beacon face consists of three 12-inch signal heads.

87-8.03 CONSTRUCTION

Install pedestrian hybrid beacon system under sections 87-4.03A and 87-4.03B.

87-8.04 PAYMENT

Not Used

Replace the 1st paragraph of section 87-12.03 with:

Install changeable message sign on sign structure under section 56-2.

10-19-18

Replace section 87-14.02 with:

10-19-18

87-14.02 MATERIALS

87-14.02A General

Vehicle speed feedback sign consists of a housing, display window, and radar unit.

Sign must:

1. Comply with the California MUTCD, Chapter 2B
2. Have an operating voltage of 120 V(ac) for permanent installations
3. Have a maximum weight of 45 lb
4. Have a wind load rating of 90 mph
5. Have an operating temperature range from -34 to 165 degrees F
6. Have a retroreflective white sheeting background

87-14.02B Housings

Housing must:

1. Be weatherproof (NEMA 3R or better) and vandal resistant
2. Be made of 0.09-inch-gauge welded aluminum with the outer surfaces being UV resistant
3. Have the manufacturer's name, model number, serial number, date of manufacture, rated voltage and rated current marked inside
4. Have the internal components easily accessible for field repair without removal of the sign

87-14.02C Display Windows

Display window consists of a cover, LED character display, and dimming control. Character display and cover must deflect together without damage to the internal electronics and speed detection components.

Cover must be:

1. Vandal resistant and shock absorbent
2. Field replaceable with the removal of external stainless-steel, tamper proof fasteners

Cover must be made of a minimum 0.25-inch-thick, shatter-resistant polycarbonate.

LED character display must:

1. Consist of two 7-segment, solid-state, numeric characters, which must:
 - 1.1. Be a minimum 15 inches in height
 - 1.2. Be visible and legible from a minimum distance of 1500 feet and legible from a minimum distance of 750 feet
 - 1.3. Consist of a minimum 16 LEDs, which must:
 - 1.3.1. Be amber and have a wavelength from 590 to 600 nm and rated for minimum 100,000 hours
 - 1.3.2. Must maintain a minimum 85 percent of the initial light output after 48 months of continuous use over the temperature range
2. Be capable of displaying the detected vehicle speed within 1 second

3. Remain blank when no vehicles are detected within the radar detection zone
4. Have the option to flash the pre-set speed limit when the detected vehicle speed is 5 miles higher than the pre-set speed
5. Be viewable only by the approaching traffic

Dimming control must:

1. Automatically adjust the character light intensity to provide optimum character visibility and legibility under all ambient lighting conditions
2. Have minimum 3 manual dimming modes of different intensities

87-14.02D Radar Units

Radar unit must:

1. Be able to detect up to 3 lanes of approaching traffic
2. Operate with an internal, low power, 24.159 GHz (K-band)
3. Be FCC approved Part 15 certified
4. Have a speed accuracy of ± 1 mph
5. Have a maximum 15 W power consumption

Replace 87-19 with:

10-19-18

87-19 FIBER OPTIC CABLE SYSTEMS

87-19.01 GENERAL

87-19.01A Summary

Section 87-19 includes specifications for constructing fiber optic cable systems.

A fiber optic cable system includes:

1. Conduit and accessories
2. Vaults
3. Warning tape
4. Fiber optic cables
5. Fiber optic splice enclosures
6. Fiber distribution units
7. Fiber optic markers
8. Fiber optic connectors and couplers

The components of a fiber optic system are shown on the project plans.

87-19.01B Definitions

Reserved

87-19.01C Submittals

At least 15 days before cable installation, submit:

1. Manufacturer's procedures for pulling fiber optic cable
2. Test reports from a laboratory accredited to International Standards Organization/International Electrotechnical Commission 17025 by the American Association for Laboratory Accreditation (A2LA) or the ANSI-ASQ National Accreditation Board (ANAB) for:
 - 2.1. Water penetration
 - 2.2. Cable temperature cycling
 - 2.3. Cable impact
 - 2.4. Cable tensile loading and fiber strain
 - 2.5. Cable compressive loading
 - 2.6. Compound flow
 - 2.7. Cyclic flexing
3. Proof of calibration for the test equipment including:

- 3.1. Name of calibration facility
- 3.2. Date of calibration
- 3.3. Type of equipment, model number and serial number
- 3.4. Calibration result

Submit optical time-domain reflectometer data files for each test in a Microsoft Excel format.

After performing the optical time-domain reflectometer test and the power meter and light source test, submit within 4 business days a hard copy and electronic format:

1. Cable Verification Worksheet
2. Segment Verification Worksheet
3. Link Loss Budget Worksheet

The worksheets are available at the Division of Construction website.

87-19.01D Quality Assurance

87-19.01D(1) General

Reserved

87-19.01D(2) Quality Control

Notify the Engineer 4 business days before performing field tests. Include exact location of the system or components to be tested. Do not proceed with the testing until authorized. Perform each test in the presence of the Engineer.

The optical time-domain reflectometer test consists of:

1. Inspecting the cable segment for physical damage.
2. Measuring the attenuation levels for wavelengths of 1310 and 1550 nm in both directions for each fiber using the optical time-domain reflectometer.
3. Comparing the test results with the data sheet provided with the shipment. If there are attenuation deviations greater than 5 percent, the test will be considered unsatisfactory and the cable segment will be rejected. The failure of any single fiber is a cause for rejection of the entire segment. Replace any rejected cable segments and repeat the test.

The power meter and light source test consists of:

1. Testing each fiber in a link using a light source at one end of the link and a power meter at the other end
2. Measuring and recording the power loss for wavelengths of 1310 and 1550 nm in both directions

Index matching gel is not allowed.

Installation and splicing of the fiber optic cable system must be performed by a certified fiber optic installer.

The optical time-domain reflectometer test and the power meter and light source test must be performed by a certified fiber optic technician.

The certification for the fiber optic installer and fiber optic technician must be from an organization recognized by the International Certification Accreditations Council and must be current throughout the duration of the project.

87-19.02 MATERIALS

87-19.02A General

All metal components of the fiber optic cable system must be corrosion resistant.

All connectors must be factory-installed and tested.

Patch cords, pigtails, and connectors must comply with ANSI/TIA-568.

Pigtails must have a minimum 80 N pull out strength.

A splice cassette may be used in place of a pigtail and a splice tray.

Each cable reel must have a weatherproof label or tag with information specified in ANSI/ICEA S-87-640 including:

1. Contractor's name
2. Contract number
3. Number of fibers
4. Cable attenuation loss per fiber at 1310 and 1550 nm

The labeled or tagged information must also be in a shipping record in a weatherproof envelope. The envelope must be removed only by the Engineer.

87-19.02B Vaults

A vault must:

1. Comply with section 86-1.02C and AASHTO HS 20-44, and load tested under AASHTO M 306.
2. Be a minimum:
 - 2.1. 4 feet wide by 4 feet high by 4 feet long nominal inside dimensions for box type.
 - 2.2. 4 feet high by 4 feet outside diameter for round type.
3. Have a minimum access of:
 - 3.1. 30 inches diameter for round type.
 - 3.2. 3 feet wide by 3 feet long for box type.
4. Be precast either modular or monolithic.
5. Have cable racks installed on the interior sides. A rack must:
 - 5.1. Be fabricated from ASTM A36 steel plate.
 - 5.2. Support a minimum of 100 pounds per rack arm.
 - 5.3. Support a minimum of 4 splice enclosures and a minimum of 4 cables with a minimum slack of 50 feet each.
 - 5.4. Be hot-dip galvanized after manufacturing.
 - 5.5. Be bonded and grounded.
6. Have a minimum:
 - 6.1. Two 4-inch diameter knockouts on each side for box type.
 - 6.2. Two 4-inch diameter knockouts placed every 90 degrees for round type.
7. Have a minimum 2-inch-diameter drain hole at the center of base.

Entry points for knockouts must not cause the cable to exceed its maximum bend radius.

The access cover must:

1. Be a two-piece torsion-assisted sections or a minimum 30-inch-diameter cast iron.
2. Have inset lifting pull slots.
3. Have markings *CALTRANS* and *FIBER OPTIC*.

87-19.02C Fiber Optic Cable

The fiber optic cable must:

1. Comply with 7 CFR parts 1755.900, 1755.901, and 1755.902, and ANSI/ICEA S-87-640
2. Be a singlemode, zero-dispersion, and have non-gel loose type buffer tubes
3. Have no splices
4. Have a Type H or Type M outer jacket
5. Be shipped on a reel
6. Have 10 feet of length on each end of the cable accessible for testing

87-19.02D Fiber Optic Splice Enclosures

A fiber optic splice enclosure must:

1. Not exceed 36 inches in length, 8 inches in width, and 8 inches in height
2. Be made of thermoplastic material, weather proof, chemical and UV resistant, and re-sealable
3. Accommodate a minimum of 8 internal splice trays
4. Have from 1/4 to 1 inch in diameter cable entry ports

5. Have brackets, clips and cable ties
6. Have means to anchor the dielectric member of the fiber optic cable
7. Include grounding hardware

87-19.02E Fiber Distribution Units

The fiber distribution unit consists of a housing, a patch panel, a 12-multicolor pigtail, and a splice tray.

The fiber distribution unit must be self-contained and pre-assembled.

The housing must:

1. Be a 19-inch rack-mountable modular-metal enclosure
2. Be a one rack unit
3. Have cable clamps to secure buffer tube to the chassis
4. Have cable accesses with rubber grommets or similar material to prevent the cable from coming in contact with the bare metal
5. Be weatherproof
6. Have a hinged top door with a latch or thumbscrew to hold it in the closed position

A patch panel must have a minimum of 12-singlefiber type connector sleeves.

A pigtail must:

1. Be a simplex single mode fiber in a 900 μm tight buffer with a 12-inch-outer-diameter PVC jacket
2. Have a fiber optic connector attached on one end and bare fiber on the other end
3. Be at least 3 feet in length
4. Have the manufacturer's part number on the jacket

Pigtails must be single-fiber or ribbon type.

87-19.02F Patch Cords

Patch cords must:

1. Be a singlemode fiber in a 900 μm tight buffer with a 0.12-inch-outer-diameter PVC jacket
2. Have fiber optic connectors attached on both ends
3. Be at least 6 feet in length
4. Have manufacturer's part number on the jacket

Duplex patch cords must be of round cable structure, and not have zip-cord structure.

87-19.02G Splice Trays

Splice trays must:

1. Have brackets to spool incoming fibers a minimum of 2 turns.
2. Have means to secure and protect incoming buffer tubes, pigtails, and a minimum of 12 heat shrink fusion splices.
3. Be stackable.
4. Have a snap-on or hinged cover. The cover may be transparent.

87-19.02H Fiber Optic Markers

Fiber optic markers must be:

1. Type K-2 (CA) object markers for vaults or pull boxes.
2. Disk markers for paved areas and transition points from unpaved to paved areas. The disk marker must be metallic, lead free and 4 inches in diameter, and must have a mounting stem at the center of the disk. The mounting stem must be a minimum 3 inches long and a minimum 0.70 inch in diameter.
3. Non-reflective Class 1, Type F, flexible post delineators for unpaved areas.

87-19.02I Fiber Optic Connectors and Couplers

Connectors must be:

1. 0.1-inch ceramic ferrule pre-radiused type
2. Capped when not used

Couplers must be made of the same material as the connector's housing and have ceramic sleeves.

Singlemode fiber optic connectors must have a yellow strain relief boot or a yellow base.

87-19.03 CONSTRUCTION

87-19.03A General

Perform the optical time-domain reflectometer test:

1. On the fiber optic cable upon its arrival to the job site and before its installation. Complete the Cable Verification Worksheet. Do not install the fiber optic cable until the Engineer's written approval is received.
2. After the fiber optic cable segments have been pulled, but before breakout and termination. Complete the Segment Verification Worksheet.
3. Once the passive cabling system has been installed and is ready for activation. If the measured individual fusion splice losses exceed -0.30 dB, re-splice and retest. At the conclusion of the optical time-domain reflectometer test, perform the power meter and light source test. If the measured link loss exceeds the calculated link loss, replace the unsatisfactory cable segments or splices and retest. Complete the Link Loss Budget Worksheet.

87-19.03B Vaults Installation

Install a vault as shown and with the side facing the roadway a minimum of 2 feet from the edge of pavement or back of dike, away from traffic.

Install the top of the vault flush with surrounding grade in paved areas and 2 inches above the surrounding grade in unpaved areas.

Place 6 inches of minor concrete around vaults. In unpaved areas, finish top of concrete at a 2 percent slope away from cover. In paved areas, finish top of concrete to match existing slope.

Bolt the steel cover to the vault when not working in it.

87-19.03C Fiber Optic Cable Installation

Install fiber optic cable by a certified installer or a representative from the fiber optic cable manufacturer during installation.

When using mechanical aids to install fiber optic cable:

1. Maintain a cable bend radius at least twenty times the outside diameter of the cable
2. Use cable grips having a ball bearing swivel
3. Use a pulling force on a cable not to exceed 500 pound-foot or manufacturer's recommended pulling tension, whichever is less

When installing the cable using the air blown method, the cable must withstand a static air pressure of 110 psi.

Lubricate the cable using a lubricant recommended by the cable manufacturer.

Install fiber optic cable without splices except where shown.

Provide a minimum of 65 feet of slack for each fiber optic cable at each vault. Divide the slack equally on each side of the splice enclosure.

Install tracer wires in the fiber optic conduits and innerducts as shown. Provide a minimum 5 feet of slack tracer wire in each pull box and vault from each direction. You may splice tracer wire at intervals of not less than 500 feet and only inside vaults or pull boxes.

If a fiber optic cable and tracer wire is installed in an innerduct, pulling a separate fiber optic cable into a spare duct to replace damaged fiber will not be allowed.

Apply a non-hygroscopic filling compound to fiber optic cable openings.

Seal the ends of conduit and innerducts after cables are installed.

Install strain relief for fiber optic cable entering a fiber optic enclosure.

Identify fibers and cables by direct labeling, metal tags, or bands fastened in such a way that they will not move. Use mechanical methods for labeling.

Provide identification on each fiber optic cable or each group of fiber optic cables in each vault and at the end of terminated fibers. Fiber optic cable must be identified as shown in the following table:

Cable Identification^a

Sequence order	Description	Code	Numbers of characters
1	Fiber type	S: Singlemode	1
2	Fiber count	###: Example 048	3
3	Begin point	T: TMC H: Hub V: Video Node D: Data Node C: Cable Node TV: Camera CM: CMS E: Traffic Signal RM: Ramp Meter TM: Traffic Monitoring/ Count Station/Vehicle Count Station (VDS, TMS) HA: Highway Advisory Radio EM: Extinguishable Message Sign RW: Roadway Weather Information System WM: Weigh In Motion WS: Weigh-Station Bypass System SV: Vault SC: Splice Cabinet	1 or 2
4	Begin point county abbreviation	AA or AAA: Examples: Orange (ORA), San Mateo (SM)	2 or 3
5	Begin point route number	###: Examples: 005, 082, 114	3
6	Begin point post mile	#####: 02470 (example 024.70): Actual PM value to the 1/100 value	5
7	End Point	In the same way as for Begin Point	1 or 2
8	End point county abbreviation	In the same way as for Begin Point County Abbreviation	2 or 3
9	End point route number	In the same way as Begin Point Route Number	3
10	End point post mile	In the same way as Begin Point Post Mile	5

^aCable identification example: The cable code S 048 SV SM 084 02470 SV SC 082 02510 describes a singlemode, 48 strand, cable starting at a fiber optic vault in San Mateo County on Route 84 at post mile 24.70, and ending at another fiber optic vault in Santa Clara County on Route 82 at post mile 25.10.

Place labels on the cables at the following points:

1. Fiber optic vault and pull box entrances and exits
2. Splice enclosures entrance and exit

3. Fiber distribution unit entrance

Lace fiber optic cable inside controller cabinets and secure to the cage.

Support the fiber optic cable within 6 inches from a termination and every 2 feet.

Secure fiber optic cables to the cable racks. Store excess cable in a figure 8 fashion.

87-19.03D Fiber Optic Cable Splices

Use fusion splicing for fiber optic cables.

Splice single-buffer tube cable to multi-buffer tube cable using the mid-span access method under manufacturer's instructions. Any mid-span access splice or fiber distribution unit termination must involve only those fibers being spliced as shown.

Place fiber splices in the splice enclosures installed in the vaults.

87-19.03E Splice Enclosures Installation

Maintain an equal amount of slack on each side of the splice enclosure.

Secure the fiber optic splices in splice tray.

Secure the splice trays to the inner enclosure.

Label cables and buffer tubes.

Do not seal fiber splice enclosure until authorized and the power meter and light source test is performed. Seal the enclosure under manufacturer's instructions.

Flash test the outer enclosure under manufacturer's instructions in the presence of the Engineer. Visually inspect the enclosure. If bubbles are present, identify the locations where the bubbles are present, take corrective actions and repeat the flash test until no bubbles are present.

Attach the splice enclosure to the side wall of a vault or hub with a minimum 2 feet distance between the ground and the bottom of the enclosure.

Secure fiber optic cables to the chassis using cable clamps for fiber optic units.

Connect a minimum of one bonding conductor to a grounding electrode after mounting the fiber optic enclosure to the wall. If there are multiple bonding conductors, organize the conductors in a neat way.

87-19.03F Fiber Optic Distribution Unit Installation

Spool incoming buffer tubes 2 feet in the splice tray and expose 1 foot of individual fibers.

Maintain a minimum 2-inch-bend radius during and after installation in the splice tray.

Splice incoming fibers in the splice tray.

Restrain each fiber in the splice tray. Do not apply stress on the fiber when located in its final position.

Secure buffer tubes near the entrance of the splice tray.

Secure splice trays under manufacturer's instructions.

Label splice tray after splicing is completed.

Install patch cords in fiber distribution units and patch panels. Permanently label each cord and each connector in the panel with the system as shown.

87-19.03G Fiber Optic Markers Installation

Install fiber optic markers at 12-inch offset on the side furthest away from the edge of travel way:

1. For fiber optic cable at 500 feet apart in areas where the distance between vaults or pull boxes is greater than 500 feet
2. Adjacent to vaults and pull boxes

3. For fiber optic cable turns at:
 - 3.1. Beginning of the turn
 - 3.2. Middle of the arc
 - 3.3. End of the turn

When a fiber optic cable crosses a roadway or ramp, install a disk marker over the conduit trench on:

1. Every shoulder within 6 inches from the edge of pavement
2. Delineated median
3. Each side of a barrier

Install markers under section 81 except each retroreflective face must be parallel to the road centerline and facing away from traffic.

87-19.04 PAYMENT

Not Used

Replace section 87-20 with:

04-19-19

87-20.01 GENERAL

Section 87-20 includes specifications for providing, maintaining, and removing temporary electrical systems.

Obtain the Department's authorization for the type of temporary electrical system and its installation method.

A temporary system must operate on a continuous, 24-hour basis.

A temporary electrical system must have a primary power source and a back-up power source from:

1. Commercial power from a utility company
2. Generator system
3. Photovoltaic system

87-20.02 MATERIALS

87-20.02A General

Material and equipment may be new or used.

Temporary wood poles must comply with section 48-6.

The components of a temporary system are shown on the project plans.

If you use Type UF-B cable, the minimum conductor size must be no. 12.

A back-up power source must:

1. Have an automatic transfer switch
2. Start automatically and transfer the system load upon reaching the operating voltage in the event of a power source failure

87-20.02B Temporary Flashing Beacon Systems

A temporary flashing beacon system consists of a flashing beacon system, wood post, and a power source.

The system must comply with the specifications for a flashing beacon system in section 87-7, except it may be mounted on a wood post or a trailer.

87-20.02C Temporary Lighting Systems

A temporary lighting system consists of a lighting system, a power source, and wood poles.

The system must comply with the specifications for a lighting system in section 87-2, except it may be mounted on a wood pole or a trailer.

87-20.02D Temporary Signal Systems

A temporary signal system consists of a signal and lighting system, wood poles and posts, and a power source.

The system must comply with the specifications for a signal and lighting system in section 87-4, except:

1. Signal heads may be mounted on a wood pole, mast arm, tether wire, or a trailer
2. Flashing beacons may be mounted on a wood post, or a trailer

87-20.02E Generators

A generator must:

1. Be 120 V(ac) or 120/240 V(ac), 60 Hz, 2.5 kW minimum, continuous-duty type
2. Be powered by a gasoline, LPG, or diesel engine operating at approximately 1,800 rpm with an automatic oil feed
3. Be equipped to provide automatic start-stop operation with a 12 V starting system
4. Have generator output circuits that have overcurrent protection with a maximum setting of 15 A
5. Have enough fuel storage to operate when it is unattended
6. Have a spark arrester complying with Pub Cont Code § 4442

87-20.02F Automatic Transfer Switches

An automatic transfer switch must provide:

1. Line voltage monitoring in the event of a power outage that signals the back-up power source to start
2. Start delay, adjustable from 0 to 6 seconds, to prevent starting if the power outage is only momentary and a stop delay, adjustable from 0 to 8 minutes, to allow the back-up power source to unload
3. Transfer delay from 0 to 120 seconds to allow the back-up power source to stabilize before connecting to the load and retransfer delay from 0 to 32 minutes to allow the line voltage to stabilize
4. Mechanical interlock to prevent an application of power to the load from both sources and to prevent backfeeding from the back-up power source to the primary power source

87-20.03 CONSTRUCTION

87-20.03A General

Provide electrical and telecommunication services for temporary systems. Do not use existing services unless authorized.

Provide power for the temporary electrical systems.

Commercial power must be 120 V(ac) or 120/240 V(ac) single phase. Make arrangements with the utility company for providing service. Protect the power source in a locked enclosure. Provide keys to all locks to the Engineer.

Install conductors and cables in a conduit, suspended from wood poles at least 25 feet above the roadway, or use direct burial conductors and cables.

You may saw slots across paved areas for burial conductors and cables.

Install conduit outside the paved area at a minimum of 12 inches below grade for Type 1 and 2 conduit and at a minimum of 18 inches below grade for Type 3 conduit.

Install direct burial conductors and cables outside the paved area at a minimum depth of 24 inches below grade.

Place the portions of the conductors installed on the face of wood poles in either Type 1, 2, or 3 conduit between the point 10 feet above grade at the pole and the pull box. The conduit between the pole and the pull box must be buried at a depth of at least 18 inches below grade.

Place conductors across structures in a Type 1, 2, or 3 conduit. Attach the conduit to the outside face of the railing.

Quality characteristic	Test method
Specific gravity and absorption of coarse aggregate	ASTM C127
Specific gravity and absorption of fine aggregate	ASTM C128
Durability index for fine aggregate	California Test 229
Soundness	California Test 214
Resistance to degradation	ASTM C131
Organic impurities	California Test 213
Chloride concentration of water for washing aggregates and mixing concrete	California Test 422
Sulfate concentration of water for washing aggregates and mixing concrete	California Test 417
Impurities in water for washing aggregates and mixing concrete	ASTM C191 or ASTM C266 and ASTM C109

Add to the end of section 90-1.01C(8):

04-19-19

For CIP structural concrete members, submit test results within 3 business days after completing each QC test. For submittal, go to:

<http://dime.dot.ca.gov/>

For CIP structural concrete members, include the following with the test results:

1. Contract number
2. Mix design number
3. Test sample identification number
4. Date and time of test
5. Batch plant
6. Batch number
7. Bridge number and description of element
8. Supporting data and calculations
9. Name, certification number, and signature of the QC tester

If additional compressive strength test results are needed for CIP structural concrete members to facilitate your schedule, submit a plot of the strength projection curve.

Add to section 90-1.01C:

04-19-19

90-1.01C(11) Quality Control Plan

Section 90-1.01C(11) applies to CIP structural concrete members.

Submit 3 copies of the QC plan for review.

Submit an amended QC plan or an addendum to the QC plan when there are any changes to:

1. Concrete plants
2. Testing laboratories
3. Plant certification or laboratory accreditation status
4. Tester or inspector qualification status
5. QC personnel
6. Procedures and equipment
7. Material sources
8. Material testing

Allow the Department 5 business days to review an amended QC plan or an addendum to the QC plan.

90-1.01C(12) Concrete Materials Quality Control Summary Report

Section 90-1.01C(12) applies to CIP structural concrete members.

During concrete production for CIP structural concrete members, submit a concrete materials QC summary report at least once a month. The report must include:

1. Inspection reports.
2. Test results.
3. Documentation of:
 - 3.1. Test result evaluation by the QC manager.
 - 3.2. Any discovered problems or deficiencies and the corrective actions taken.
 - 3.3. Any testing of repair work performed.
 - 3.4. Any deviations from the specifications or regular practices with explanation.
4. Certificate of compliance for the structural concrete material signed by the QC manager. The certificate must state that the information contained in the report is accurate, the minimum testing frequencies specified in section 90-1.01D(10)(d) are met, and the materials comply with the Contract.

Add to section 90-1.01D:

04-19-19

90-1.01D(7) Qualifications

Section 90-1.01D(7) applies to CIP structural concrete members.

QC laboratory testing personnel must have an ACI Concrete Laboratory Testing Technician, Level 1 certification or an ACI Aggregate Testing Technician, Level 2 certification, whichever certification includes the test being performed.

QC field testing personnel and field and plant inspection personnel must have an ACI Concrete Field Testing Technician, Grade I certification.

90-1.01D(8) Certifications

Section 90-1.01D(8) applies to CIP structural concrete members.

Each concrete plant used for CIP structural concrete members must:

1. Have a current certification for ready mixed concrete production facilities from the National Ready Mixed Concrete Association. Plant Certification Checklist and supporting documentation must be available upon request.
2. Be tested and authorized under the Department's *MPQP*.

Each QC testing laboratory must be an authorized laboratory with current accreditation from the AASHTO Accreditation Program for the tests performed.

90-1.01D(9) Preconstruction Meeting for CIP Structural Concrete

Section 90-1.01D(9) applies to CIP structural concrete members.

Before concrete placement, hold a meeting to discuss the requirements for structural concrete QC. The meeting attendees must include the Engineer, the QC manager, and at least 1 representative from each concrete plant performing CIP structural concrete activities for the Contract.

90-1.01D(10) Quality Control

90-1.01D(10)(a) General

Section 90-1.01D(10) applies to CIP structural concrete members.

Develop, implement, and maintain a QC program that includes inspection, sampling, and testing of structural concrete materials for CIP structural concrete members.

Perform all sampling, testing, and inspecting required to control the process and to demonstrate compliance with the Contract and the authorized QC plan.

Provide a QC field inspector at the concrete delivery point while placement activities are in progress.

Provide a testing laboratory and the testing personnel for QC testing.

The QC inspector and the QC manager must be fully authorized by the Contractor to reject material.

QC testers and inspectors must be your employees or must be hired by a subcontractor providing only QC services. QC testers and inspectors must not be employed or compensated by a subcontractor or by other persons or entities hired by subcontractors who will provide other services or materials for the project.

If lightweight concrete, RSC or SCC is used as structural concrete, you must also comply with the sampling and testing specifications of that section.

90-1.01D(10)(b) Quality Control Plan

The QC plan must detail the methods used to ensure the quality of the work and provide the controls to produce concrete. The QC plan must include:

1. Names and documentation of certification or accreditation of the concrete plants and testing laboratories to be used
2. Names, qualifications, and copies of certifications for the QC manager and all QC testing and inspection personnel to be used
3. Organization chart showing QC personnel and their assigned QC responsibilities
4. Example forms, including forms for certificates of compliance, hard copy test result submittals, and inspection reports
5. Methods and frequencies for performing QC procedures, including inspections and material testing
6. Procedures to control quality characteristics, including standard procedures to address properties outside of the specified operating range or limits, and example reports to document nonconformances and corrective actions taken
7. Procedures for verifying:
 - 7.1. Materials are properly stored during concrete batching operations
 - 7.2. Batch plants have the ability to maintain the concrete consistency during periods of extreme heat and cold
 - 7.3. Admixture dispensers deliver the correct dosage within the accuracy requirements specified
 - 7.4. Delivery trucks have a valid National Ready Mixed Concrete Association certification card
8. Procedures for verifying that the weighmaster certificate for each load of concrete shows:
 - 8.1. Concrete as batched complies with the authorized concrete mix design weights
 - 8.2. Moisture corrections are being accurately applied to the aggregates
 - 8.3. Cementitious materials are from authorized sources
 - 8.4. Any water that is added after batching at the plant
9. Procedures for visually inspecting the concrete during discharge operations

Allow the Department 5 business days to review an amended QC plan or an addendum to the QC plan.

90-1.01D(10)(c) Quality Control Manager

Assign a QC manager. The QC manager must have one of the following qualifications:

1. Civil engineering license in the State
2. ACI Concrete Laboratory Testing Technician, Level 1 certification
3. NICET Level II concrete certification
4. ICC Reinforced Concrete Special Inspector certification
5. ASQ Certified Manager of Quality/Organizational Excellence with the qualifying 10 years of experience and body of knowledge in the field of concrete

During concrete placement, the QC manager must be at the plant or job site within 3 hours of receiving notification from the Engineer.

90-1.01D(10)(d) Quality Control Testing Frequencies

For each mix design used to produce CIP structural concrete, perform sampling and testing in compliance with the following tables:

Aggregate QC Tests

Quality characteristic	Test method	Minimum testing frequency
Aggregate gradation	California Test 202	Once per each day of pour
Sand equivalent	California Test 217	
Cleanness value	California Test 227	
Moisture content of fine aggregate	California Test 226	1–2 times per each day of pour, depending on conditions

Concrete QC Tests

Quality characteristic	Test method	Minimum testing frequency
Slump	ASTM C143/C143M	Once per 100 CY or each day of pour, whichever is more frequent, and when requested by the Engineer
Uniformity ^a	ASTM C143/C143M, California Test 533, and California Test 529	When ordered by the Engineer
Air content, (freeze-thaw area)	California Test 504 ^b	If concrete is air entrained, once per 30 CY or each day of pour, whichever is more frequent
Air content, (non-freeze-thaw area)	California Test 504 ^b	If concrete is air entrained, once per 100 CY or each day of pour, whichever is more frequent
Temperature	California Test 557	Once per 100 CY or each day of pour, whichever is more frequent
Density	California Test 518	
Compressive strength ^{c,d}	California Test 521	

^aAs specified in section 90-1.01D(4)

^bUse ASTM C173/C173M for lightweight concrete.

^cMark each cylinder with the Contract number, the date and time of sampling, and the weighmaster certificate number.

^dYou may need additional test samples to facilitate your schedule.

90-1.01D(10)(e) Inspection Reports

Document each inspection performed by a QC inspector in an inspection report that includes:

1. Contract number
2. Mix design number
3. Date and time of inspection
4. Plant location
5. Concrete placement location
6. Batch number
7. Reviewed copies of weighmaster certificates
8. Description of the inspection performed
9. Name, certification number, and signature of the QC inspector

90-1.01D(10)(f) Rejection of Material

If any of the QC concrete test results fail to comply with the specified requirements, the batch of concrete must not be incorporated in the work. Notify the Engineer. Repeat the QC concrete tests on each subsequent batch until the test results comply with the specified requirements.

If 3 consecutive batches fail to comply with the specified requirements, (1) revise concrete operations as necessary to bring the concrete into compliance and (2) increase the frequency of QC testing. The revisions must be authorized before resuming production. After production resumes, you must receive authorization before returning to the QC testing frequency authorized in the QC plan.

90-1.01D(11) Department Acceptance

The Department accepts concrete incorporated into CIP structural concrete members based on only the Department's test results. QC test results will not be used for Department acceptance.

Replace the table in section 90-1.02G(6) with:

04-19-19

Type of work	Nominal		Maximum	
	Penetration	Slump	Penetration	Slump
	(in)	(in)	(in)	(in)
Concrete pavement	0–1	--	1.5	--
Nonreinforced concrete members	0–1.5	--	2	--
Reinforced concrete structures with:				
Sections over 12 inches thick	0–1.5	1–3	2.5	5
Sections 12 inches thick or less	0–2	1–4	3	6
Concrete placed under water	--	6–8	--	9
CIP concrete piles	2.5–3.5	5–7	4	8

Replace the introductory clause of the 6th paragraph of section 90-1.02H with:

04-19-19

For pavement, the total cementitious material must be composed of one of the following options, by weight:

Add after the 6th paragraph of section 90-1.02H:

04-19-19

For structures, the total cementitious material must be composed of one of the following options, by weight:

1. 25 percent natural pozzolan or fly ash with a CaO content of up to 10 percent and 75 percent portland cement.
2. 20 percent natural pozzolan or fly ash with a CaO content of up to 10 percent, 5 percent silica fume, and 75 percent portland cement.
3. 12 percent silica fume, metakaolin, or UFFA, and 88 percent portland cement.
4. 50 percent GGBFS and 50 percent portland cement.
5. 25 to 50 percent fly ash with a CaO content of up to 10 percent, and no natural pozzolan. The remaining portion of the cementitious material must be portland cement or a combination of portland cement and UFFA, metakaolin, GGBFS, or silica fume.

Replace section 90-1.03B(2) with:

04-19-19

90-1.03B(2) Water Method

The water method must consist of keeping the concrete continuously wet by applying water for a curing period of at least 7 days after the concrete is placed.

Keep the concrete surface wet by applying water with an atomizing nozzle that forms a mist until the surface is covered with curing media. Do not allow the water to flow over or wash the concrete surface. At the end of the curing period, remove curing media.

Use any of the following curing media to retain moisture:

1. Mats, rugs, or carpets
2. Earth or sand blankets
3. Sheeting materials complying with the durability and water vapor transmission rate specified in section 5 of ASTM C171

SPECIAL PROVISIONS
(CIVIL)

TECHNICAL SPECIFICATIONS

GENERAL

1. GENERAL

The work to be done consists of furnishing all materials, equipment, tools, labor and incidentals as required in the specifications and contract documents. The general items of work include removal of existing AC and PCC pavement, construction of AC and PCC pavement, bike path, cold milling and overlay, removal and construction of curb and gutter, sidewalk, driveways, cross gutter, curb ramps, construction of landscaped slope, storm drain, inlets, catch basin, landscape/irrigation, traffic signal modifications, signing and striping, street lighting, and all other items not mentioned but indicated in the Plans and Specifications.

All work as shown on the Contract Drawings and indicated on the Contract Documents, including General Conditions and General Requirements, shall conform to the latest edition of the Standard Specifications for Public Works Construction (SSPWC), the “Green Book” , and as supplemented and clarified herein.

All work within the City of Los Angeles’ jurisdictional boundary shall conform to the latest edition of the “Green Book” as modified by the current edition of the City of Los Angeles, Department of Public Works Additions and Addendums to the Standard Specifications for Public Works Construction (Brown Book), latest edition. All traffic signal and/or related electrical work shall conform to the standards under Section 2000, Subsection 1.1, and the Special Provisions and Standard Drawings for the Installation and Modification of Traffic Signals, issued by the City of Los Angeles Department of Transportation (LADOT), red book and City of Los Angeles Bureau of Street Lighting (LABSL), blue book, as well as the LADOT Written Material or Purchase Specifications.

2. MOBILIZATION

GENERAL

Mobilization and traffic control shall conform to the provisions of Sections 9-3.4 of the Standard Specifications and Special Provisions of this specification, except modified herein.

The scope of the work shall include the obtaining of all bonds, insurance; moving onto the site of all project work areas and equipment; and the furnishing of other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include but not be limited to the following principal items:

Notification to businesses.

Contractor will be required to print and distribute a 7-day advance notice to each business that may be impacted by the construction. Submit the notices to the City for approval.

The movement of personnel, equipment, supplies and incidentals to the project site.

Furnishing, installing, and maintaining all storage yards or sheds required for temporary storage of products, equipment, or materials that have not yet been installed in the Work. Construction yard: As required by Section 7-8.4 of the Special Provisions, the contractor is responsible for locating the construction yard for its construction operation. The contractor shall provide lease agreement and insurance prior to use any rented lot.

1. Confined space entry to excavations
2. Have the Contractor's superintendent at the job site full time.
3. Submittal of required construction schedule as specified.
4. All submittals as required in the specifications.
5. Provide Class "B" field office.
6. Prepare SWPPP for approval prior to construction and Implement SWPPP and BMP throughout construction.

All submittals (three copies) shall be submitted no later than two weeks after the contract award.

The maximum price for this bid item **shall not exceed 5 percent** of the total contract price of total base bid. **Bid ITEM NO. 1 - Mobilization** includes all work necessary to mobilize and demobilize forces, equipment, transportation, and materials; obtain bonding, insurance, permits, licenses; SWPPP, and other work as necessary to prepare for constructing the work.

PAYMENT

Payment for **BID ITEM NO. 1 - MOBILIZATION** shall be at the contract lump sum (LS) bid price and shall be payable as follows for each payment upon approval of the Public Works Director/City Engineer.

- a. Payment of up to 50 percent of the contract lump sum (LS) bid price for mobilization at the first progress payment.
- b. Payment to 75 percent of the contract lump sum (LS) bid price for mobilization and restoration or resetting of survey monuments, when the monthly partial payment estimate of the total amount earned to date, not including the amount earned for mobilization, is 50 percent or more of the original contract amount.

- c. Payment to 100 percent of the contract lump sum (LS) bid price for mobilization and restoration or resetting of survey monuments, when the monthly partial payment estimate of the total amount earned to date, not including the amount earned for mobilization, is 75 percent or more of the original contract amount.

3. TEMPORARY TRAFFIC CONTROL

Traffic Control shall conform to the provisions of Sections 7-8 and 7-10 of the Standard Specifications and Special Provisions of this specification, except as modified herein:

The Contractor shall provide adequate pedestrian and vehicular traffic controls for the duration of the work in accordance with the Contract Documents including Subsection 7-10 of the SSPWC, the Work Area Traffic Control Handbook (WATCH), Manual for Uniform Traffic Control Devices (MUTCD), latest edition, and the City of Culver City.

The Contractor shall provide all traffic controls necessary to provide for the safe and expeditious movement of traffic, motorized and non-motorized (including pedestrian traffic) through the construction zones, as well as those necessary to provide for the safety of the work force performing the construction, including two flagmen to direct traffic if deemed necessary by the Public Works Director/City Engineer.

Contractor shall provide and post “no parking” signs at least 48 hour prior to its work, if necessary.

Contractor shall utilize k-rail for all aspects of the construction for protection of the work area, except for areas such as a driveway and intersection work where k-rail and crash cushions may not be feasible. In this case, contractor may utilize barricades and delineators to channel traffic through the work zone, as approved by the Engineer. When barricades and delineators are used, contractor shall maintain a minimum of 5' clearance between excavation and the travel way. Barricades and delineators shall be maintained by the Contractor at all times. Temporary K-Rail Barricades next to roadway excavation can be either concrete, or plastic (waterfilled) approved by Caltrans. The Contractor shall include any temporary pavement necessary for the safe and expeditious movement of traffic.

Business access shall be maintained at all times. At driveways or alley entryways, the Contractor may need construct improvements in phases in order to maintain the access. Short duration of closure during paving operation shall be coordinated with each business in advance.

The Contractor may, at his expense, submit and propose an alternative Construction Traffic and Phasing Plans to the Engineer for consideration.

Alternate Route and Signage

Should an alternate route or signage is required, the contractor shall prepare alternate route plans (due to the traffic lanes reduction during construction) for city's approval. The approved signage shall be installed and maintained by the Contractor throughout the duration of the construction project.

Information Signs

Information signs shall be provided as specified for each sign type described in this Subsection. For each sign style, Contractor shall submit a layout for approval prior to fabrication.

1. Business Open Signs. Size: 72 inch by 48 inch.

Title Lettering: Open for Business - 5 inch letters.

Other Lettering: Eight (8) business names, one per line conforming to names as shown on storefronts - 3.5-inch letters.

Lettering Style: To be selected by City from a wide range of templates supplied by Contractor.

Sign and Lettering Colors: To be selected based on samples submitted by Contractor of shades and colors approximating those requested by City.

Material: 2 -inch Marine plywood painted two coats overall with base color.

Mounting: Mount on 6 feet wide, Type 3 barricades, two bolts on top cross board and two bolts on center cross board, such that the sign is at maximum height and bolt pattern is stable.

Sign Placement: Signs shall be placed at convenient locations along the roadway in front of and before passing the businesses listed on the sign in the direction of travel on the side of the street under construction, and as approved by the Engineer. Signs will be installed only along frontages where construction that prohibits parking is being performed. Signs shall be left at the same general location if the area is open for parking between times of construction, but must be moved off of the roadway pavement.

2 Access Signs. Size: 36 inch by 24 inch

Title Lettering: Driveway Access - 7 inch letters, narrow style to fit on sign

Other: Provide 90 degree curved arrow around left and top perimeter edge of sign adjacent to lettering. The arrow shall be three inches wide and arrowhead shall be five inches wide by 8 inches long.

Colors and style of lettering shall conform to business open signs.

Material: 2 -inch Marine plywood painted two coats overall with base color.

Sign Placement. Signs shall be mounted to standard type barricades and placed directly ahead of an access point serving a driveway or multiple driveways. The sign shall be mounted with brackets or other devices that will maintain the sign in place with the bottom edge no lower than the bottom of the top panel on the barricade such that the sign will not be dislodge during normal construction activities and traffic conditions.

3 Project Signs. Two (2) each Size: 30 inch by 60 inch

Title Lettering:

Sponsored by

Three inch letters narrow style.

Other Lettering:

Colors and the letter styles shall conform to Business Open signs.

Other:

Sign placement: Signs shall be mounted at a height on street light poles as directed by the Engineer. Contractor shall provide mounting fastening devices that will not damage the pole but will securely clamp the sign at two points, one near the top and one near the bottom of the sign. Mounting hardware shall be made of corrosion resistant material.

Payment

Payment for **BID ITEM NO. 2 – TEMPORARY TRAFFIC CONTROL** shall include the preparation of Traffic Control and Detour Plans per fourth paragraph Subsection 7-10-1, including the implementation per Sections 7-8 and 7-10 and this Special Provisions, detour plans, alternate route plans and signage, and no additional compensation for Traffic Control Plans will be allowed therefor.

The cost for all information signs shall be included in the bit item of Traffic Control, and shall include full compensation for furnishing and full installation, including the mounted barricade, all necessary hardware to sustain the sign installation as specified, and place and replace, as necessary during changing conditions, the business and access signs. Contractor shall provide the barricades for mounting and shall retain ownership of them at the end of the project. Bid item prices shall include all labor materials and incidentals, and no additional payment will be provided therefor.

4. CHANGEABLE MESSAGE SIGNS

Unless directed otherwise, the Contractor shall provide and maintain Five (5) portable Changeable Message signboards throughout the construction on all major arterial streets. The signboards shall be installed one week prior to begin construction. Contractor will be responsible to provide Five (5) Large (4' x 6') Changeable Message Signs (CMS) to be installed at a location approved by the City Engineer or his/her designee. The CMS shall be installed no later than seven (7) calendar days prior to start of work and shall remain in operation throughout the duration of the construction project. Contractor shall be responsible set up message board and submit text for approval by the City. CMS must be in operation at all time, unless the City Engineer or his/her designee has instructed the Contractor to temporarily turn off the CMS. Contractor shall be responsible to maintain or replace the CMS if they are not operational.

Payment

Payment for **BID ITEM NO. 3 - CHANGEABLE MESSAGE SIGNS** shall be per each (EA) CMS. shall include full compensation for all labor, materials, tools equipment, transportation, delivery, message set-up, and incidentals necessary to do all the work involved thereof, complete, in place, and accepted.

5. COORDINATION WITH SOUTHERN CALIFORNIA EDISON RELOCATION WORK

On the south side of Higuera Street (at approximately Station 48+80), it is anticipated that Southern California Edison (SCE) will relocate existing guy wire and pole located in the private property of LA Gymnastics concurrently with the Contractor's street improvement and bridge replacement construction.

The Contractor is directed to coordinate its work with the SCE relocation work and in no case shall the existing curb/gutter be removed prior to the completion of relocation work. The stage construction shall be adjusted by the Contractor to allow such coordination.

Contractor's shall contact SCE's representative to verify its relocation schedule prior to preparing and submitting the street improvements project schedule to the Engineer. Contractor shall adjust its work plans/schedule accordingly, should there be work delays on the SCE relocation work at no additional cost to the City.

Payment

Payment for utility coordination shall be included in various bid items for the work is performed, and no additional or separate compensation is allowed therefor. No consequential damage is allowed.

---END OF GENERAL SECTION---

TECHNICAL SPECIFICATIONS

PART 2 CONSTRUCTION MATERIALS

SECTION 200 - ROCK MATERIALS

200-1 ROCK PRODUCTS

200-1.3 Gravel. Pea gravel for irrigation valve box drainage shall have 100 percent passing the 3/8-inch sieve and less than 5 percent passing the No. 8 sieve.

200-1.4 Aggregate. Coarse aggregate for Sump Drains shall be Concrete Aggregate No. 2.

200-2 UNTREATED BASED MATERIALS

200-2.2 Crushed Aggregate Base.

200-2.2.3 Quality Requirements. The minimum R-value requirement will not be waived.

200-2.4 Crushed Miscellaneous Base.

200-2.4.3 Quality Requirements. The minimum R-Value requirement will not be waived. Contractor should provide test gradation results and R-value for actual material supplied to the project.

SECTION 201 - CONCRETE, MORTAR, AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

201-1.1 Requirements

201-1.1.1 General.

The same brand, type, and source of cement and aggregate shall be used for all portland cement concrete.

Portland cement concrete shall achieve minimum flexural strength of 450 psi (for a equivalent of 2,500 psi compressive strength) in 72 hours.

The Contractor may propose an alternate design (curing time, flexural strength) for consideration by the Engineer.

The Contractor shall submit concrete mix designs within 2 weeks from the award of the contract. An additional mix design for PCC pavement shall be submitted for approval at locations of small areas to be paved.

Special Provisions

SP - 7

Contractor shall submit flexural strength and shrinkage information as part of submittals of mix design of PCC for pavement, including graphs of flexural and compressive strength over time for evaluation by the Engineer.

201-1.1.2 Concrete Specified by Class.

Concrete for Stamped Concrete Maintenance Work and Median Nose shall be Class 560-E-3250 with 4-inch maximum slump.

Concrete for irrigation controller cabinet, concrete header in tree well and concrete thickened edge in tree well shall be 560-C-3250 with a 4" maximum slump.

201-1.2 Materials.

201-1.2.4 Admixtures.

METHOD "A"

Color Hardener. Colored hardener for stamped concrete shall be equal to dry shake colored additive by Davis Colors be as shown in the table below:

Color Additive:	Davis Color – 10134 Terra Cotta
Release Agent:	Davis Color – 10134 Terra Cotta
Antiquing Agent	Davis Color – City Select

METHOD "B"

Colored concrete shall be equal to "Chromix" admixture for color-conditioned concrete by Davis Colors, or equal. Color shall be as shown in the table below:

Color:	Davis Colors – 10134 Terra Cotta
Clear Sealer:	W-111 Clear Cure and Seal – Color Seal II tinted to match color

Refer to Section 201-4.1.1 Color Curing Compound, in these Special Provisions.

Prior to start of colored stamped concrete work, Contractor shall submit three-color samples to the Engineer for approval, together with three copies of the manufacturer's printed instructions, bulletins, and specifications.

201-3 EXPANSION JOINT FILLER AND JOINT SEALANTS

201-3.1 General. Contractor shall submit materials to Engineer for approval.

201-3.4 Sealant shall be Type "A" with Polyethylene foam filler as required by plan details. Submit two samples to the Engineer for approval.

201-4 CONCRETE CURING MATERIALS

201-4.1 Membrane Curing Compounds

201-4.1.1 General. Concrete curing compound shall be Type 1-D.

Color curing compound for colored stamped concrete shall be the same color and manufacturer as the color hardener.

SECTION 203 - BITUMINOUS MATERIALS

203-6 ASPHALT CONCRETE

203-6.1 General. Asphalt concrete material used for asphalt concrete in AC areas behind driveways shall be Class and Grade C2-PG 64-10.

Asphalt concrete to construct AC pavement in the roadway shall be B- PG 64-10.

SECTION 209 – STREET LIGHTING AND TRAFFIC SIGNAL MATERIALS

Add new Section 209-6 LANDSCAPE ELECTRICAL SYSTEMS

209-6 LANDSCAPE ELECTRICAL SYSTEMS.

209-6.1 General. All materials and equipment shall be new and bear the label of or be listed by the Underwriter's Laboratories or the National Fire Protection Association, where applicable. All material shall be the standard products of manufacturer, regularly engaged in the production of such material, and shall be the latest improved design. All material of the same type or of one system shall be supplied by the same manufacturer.

In no case shall conduits, wires, etc., be smaller in size or less in number than that shown on Plans or called for in these Specifications, even though codes may accept otherwise.

209-6.2 Proposed Substitutions and "Or Equal." Refer to the Section E, Section 4-1.6.

Equipment and wiring shown on the plans is for materials as specified. Should equipment of other manufacturers be approved for use, the Contractor shall make all changes in other equipment, conduit, wiring, or location of equipment that may be required due to design or space allotment, as approved by the Engineer, without charge to the Agency.

It is the Contractor's responsibility to show that all products proposed for substitution are equal to the specified item by submitting sufficient information to permit a comparative check. The term "equal" shall mean that the product or materials offered shall have equivalent or more value to the Agency based on the value of the item set forth in the specifications or on the Plans, and then only after the Contractor's written submittal has been approved in writing. If, after installation, substituted equipment is found to be not equal to that specified, that equipment shall be replaced with approved item(s) at no cost to the Agency.

209-6.3 Inspection. At the time of electrical inspections, the Contractor shall make available a complete set of working drawings showing progress to date and detail variations from the plans. All variations must have prior approval of the Engineer.

209-6.3.1 Materials and Workmanship. Materials and workmanship, unless indicated or specified otherwise, shall be in strict conformity with the standards of the latest editions including revisions of the Electrical Code of the County, National Electric Code (current edition) of the National Board of Fire Underwriters, CAL/OSHA, Electrical Safety Orders, and the Standards of the National Electrical Manufacturers Association. Nothing in these Plans or Specifications shall be construed to permit work below the standards of these ordinances and those of OSHA. After acceptance of the contract, all work found which does not conform or comply with the applicable code shall be brought into conformance at no cost to the Agency.

209-6.4 Referenced Specification. Reference in this Specification to the STANDARD SPECIFICATIONS (STD. SPECS) shall mean the appropriate section of the STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, APWA/ AGC, LATEST EDITION and all supplements thereto, as published by Building News, Inc., Los Angeles, California.

209-6.5 Materials.

(a) Meter Pedestal. Existing.

- (b) Conductors. All conductors shall be copper, type "THWN" below grade and type "THHN/THWN" for exposed conditions and above grade.
- (c) Conduit. Exposed conduit shall be hot dipped galvanized rigid steel conduit. All ells shall be factory made rigid galvanized steel conduit. No PVC ells shall be used unless noted on drawings. All ells 45 degrees and larger shall be sweep bends. All rigid steel conduit exposed to earth 12-inches above finished grade shall be wrapped with 20 mil PVC tape, Scotch tape No. 40 green or equal. PVC conduit shall be U.L. listed "Schedule 40" with properly cemented fittings. All underground shall be PVC Schedule 40. PVC conduit shall contain a green grounding conductor. All stub ups into switchboards shall be green grounding conductor. All stub ups into switchboards shall be rigid galvanized steel conduit with ground bushings properly grounded. All PVC stub outs shall be equipped with non-cemented approved PVC pipe caps.
- (d) Bushings, Locknuts, and Conduit Fittings. Boxes, bushings, locknuts, and similar devices shall be galvanized cast steel or cast iron, malleable iron, or galvanized steel. Aluminum die cast or pot metal fittings or boxes are not approved. Conduit fiber-lined bushings are required to be used with locknuts at cabinets, switchboards, housing, and pull boxes, etc. All conduit with cable shall be sealed at each end. Grounding bushings shall be provided on underground rigid conduits.
- (e) Pull Boxes. Precast pull boxes by Brooks Concrete Products or Quickset are approved. Covers shall be cast iron and bolted down with tamperproof screws. Size by code.
- (f) Wire and Cable. Branch circuit wire shall be copper type THW-75 degrees or THHN/THWN in conduit and poles, as manufactured by General Electric, Paronite, General Circle, Cirro, or Anaconda, 600v. Ground wire shall be green TW or THW. Wires shall be color coded for each leg. Neutral shall be white THW or THWN. Identify cable by circuit number in each pull box by W.P. Tag. No. 6 and larger cable shall be type THW-75 degrees stranded copper. Approved manufacturers: General Electric, Paronite, Okonite, Anaconda, General. Cable underground shall be color-coded by phase. Stranded wire shall be used in poles from pull boxes to fixtures. Provide manufactured cable grips in poles to support cables.
- (g) Switches and Receptacles - Leviton Specification Grade or equal.
- (h) Circuit Breakers. All circuit breakers shall conform to Federal Specifications W-C-375, Class 2b or 2c for 120/240 volt and shall be provided with a device for locking circuit breakers in "OFF" position.
- (i) Contactors and Relays. Contactor shall be designed for 600 volts AC mechanically held and be rated for tungsten, mercury arc, or other reactive

lighting loads and shall be equal to Square D - Type M, Class 8903 in NEMA 1 housing. Relays. Shall be 120V AC coil, 10 amp contacts housed in NEMA 1 housing. Relays shall be equal to Square D - Type M, Class 8903.

209-6.6 Submittals, Shop Drawings, and Record Drawings

209-6.6.1 Material List. Three copies of a complete materials list with brochures showing all equipment indexed with job title, date, etc., shall be submitted to the Engineer within 10 days after award of Contract. Submitting a catalog number and manufacturer's name, and stating that the material or item to be furnished will meet the specifications will not be acceptable.

List the following items by make and number in the submittal:

Underground conduit, rigid galvanized steel conduit, cable, wire, pull boxes, main switchboard, poles, fixtures, lamps, control equipment, panels, outlets, boxes, etc.

209-6.6.3 Distribution and Control Section. Submit 3 sets of shop drawings for approval.

209-6.6.4 Record Drawings. Record drawings shall be prepared by the Contractor and maintained in the field. All changes in the work shall be recorded daily, accurately, on a set of blue line prints.

The location of all underground conduits and stub-outs shall also be shown, fully dimensioned to two points of architectural reference such as buildings, walks, walls, curbs, paving, monuments, etc., record junction and pull boxes not shown on the drawings.

Upon completion of each portion of the work, immediately transfer all such record information to the prints. All changes and dimensions shall be recorded legibly with a red-point pen to the satisfaction of the Engineer. Data shall be recorded daily and shall be subject to inspection at all times.

Failure to provide record drawings shall be cause to reschedule inspections and withhold approval of progress payment requests.

Upon completion of the work and final inspection, the record information shall be delivered to the Engineer. The Engineer's approval of record drawings is a condition of approval of final payment.

SECTION 212 - LANDSCAPE AND IRRIGATION MATERIALS

212-1 LANDSCAPE MATERIALS

212-1.1 Topsoil.

Topsoil shall be Class A or C.

All Class A topsoil shall be tested for agricultural suitability. The test results from samples taken at the source shall be delivered to the Engineer at least 10-working days prior to anticipated delivery date to the site. Should the proposed source material be unsatisfactory, the Contractor shall locate a suitable material, and shall pay all additional costs for testing.

Class C topsoil shall be tested for agricultural suitability. Three tests at three different locations shall be performed. Exact locations of tests shall be field verified and approved by Engineer.

212-1.1.2 Class "A" Topsoil

Add the following:

Soil for tree well backfill shall be Class A Topsoil with the following restrictions: Gradation limits shall be 85 percent through 95 percent sand, maximum 10 percent silt, maximum 5 percent clay. The permeability rate shall be not less than 38mm (1½ ") per hour and no greater than 75mm (3") per hour.

212-1.2 Soils Fertilizing and Conditioning Materials

212-1.2.3 Commercial Fertilizer.

Commercial fertilizer shall be 12-12-12 NPK.

Planting tablets shall be tightly compressed, long-lasting, slow-release fertilizer tablets weighing 21 grams, with a potential acidity of not more than 5 percent by weight and having an analysis of 20-10-5.

212-1.2.4 Organic Soil Amendment.

Organic soil amendment shall be Type 1.

212-1.2.5 Mulch.

Mulch shall be Type 5 graded fir Nitrolized wood chips, 1 inch to 3 inch in size by 3/8 inch to 5/8 inch in diameter.

212-1.2.6 Add New Section 212-1.2.6 Soil Conditioner:

212-1.2.6 Soil Conditioners.

Iron Sulfate. Iron sulfate shall be ferric sulfate or ferrous sulfate in pelleted or granular form, containing not less than 18.5 percent iron expressed as metallic iron and shall be registered as an agricultural mineral with the State Department of Agriculture in compliance with Article 2, "Fertilizing Materials," Section 1030 of the Agricultural Code.

212-1.4 Plants.

212-1.4.1 General. Add:

Varieties shall be as shown on the drawings.

All quantities shall be verified by an actual count on the drawings.

Plants, including trees, shrubs, and ground covers, shall have been grown in nurseries inspected by the State Department of Agriculture.

Inspection and approval of plants is required. Engineer may reject entire lot of plants represented by defective samples. Plants not approved are to be removed from site immediately and replaced with suitable plants. All plants will be inspected on site of work prior to installation.

212-1.4.2 Trees. Add:

- (a) Contractor Furnished Trees: All trees not noted as "Agency-Furnished" or "City-Furnished" shall be selected by the Contractor and inspected by the Engineer. All trees of 24-inch (600mm) box size or larger shall be inspected at the nursery. Inspections at no cost to the Contractor will be limited to three nurseries, all within a 30-mile radius of the site of work. Additional inspections and

inspections out of the area will be charged to the Contractor at the Engineer's standard billing rate in effect at the date of bid, plus mileage costs, and will be deducted from payments due to the Contractor.

- (b) All trees of 24-inch (600mm) size or larger shall be guaranteed for 1 year. Guarantee period shall start on the date the Contractor is relieved of landscape maintenance responsibility.

212-1.5 Headers, Stakes and Ties.

212-1.5.3 Tree Stakes. Stakes shall be round, 10-feet (3m) long, conically pointed at one end, minimum 2-inch (50mm) diameter. Stake material shall be Lodgepole pine, pressure treated with wood preservative.

212-1.5.4 Tree Ties. Tree ties shall be V.I.T. rubber cinch ties or fabricated item approved by the Engineer. Wire devices shall not be used.

Add new Section 212-1.7 Landscape Materials.

212-1.7.1 Filter Cloth. Filter cloth shall be a geo-textile fabric, as specified in Table 213-2.2 (A), a Type 90N, or Mirafi 140s, Trevira Spunbond S 1115, or equal.

212-1.7.2 Moisture Barrier. Moisture barrier shall be single width sheet flexible PVC or PE membrane of 0.030 mil thickness.

212-1.7.3 Root Control Barrier. (Refer to Section 308-3.2) Root control barrier shall be 24-inches (600mm) wide by 0.080-inches (2mm) thick high impact polyethylene or polypropylene sheeting with reinforced double top edge, manufactured for root barrier purposes. Sheeting shall have integrally molded root deflector ribbing and integrally molded joiner strips.

212-1.7.4 Samples. Within 15 calendar days of award of contract, submit one 24-inch by 24-inch (600mm x 600mm) sample of each item with joining strip or seam and two copies of manufacturer's technical data for approval.

Add new Section 212-1.9 Tree Well Covers:

212-1.9.2 Tree Grates. Tree grates and frames shall be the type as specified on the drawings.

212-2 IRRIGATION SYSTEM MATERIALS

General. Within 15 days after award of contract, submit for review 3 copies of a complete materials list, including manufacturer's name and number, covering all material required

under this contract, together with 3 copies of descriptive literature on all items listed. Commence no irrigation system construction prior to receipt of Engineer's determination.

Item Description	Item Description
Shut-off gate and butterfly valves (S.O.V.)	S.O.V. valve box, lid and sleeve/extension
Irrigation controller	Irrigation controller enclosure
Plastic pipe, pipe fittings, swivel joints	Primer and solvent for plastic pipe
Metal pipe, fittings	Pipe anchors
Remote control valves (R.C.V.)	R.C.V. valve box and lid
Identification wire and tape	Wire and connectors
Quick coupling valves (Q.C.V)	Q.C.V. valve box and lid
Irrigation heads, bodies, and nozzles	Check valves
Irrigation control wire and connectors	Control wire conduit and pull boxes
Hose swivels	Valve operating wrench
Quick couplers	

212-2.1 Pipe and Fittings. Plastic pipe ¾ inch (20mm) through 1½ inches (40mm) shall be PVC 1120, Schedule 40 solvent welded pipe. Pipe for reclaimed water systems shall be purple pigmented and marked "Reclaimed Water."

Plastic pipe 2 inches (50mm) and over shall be PVC 1120, Class 315 solvent welded pipe.

All pipe sleeving shall be PVC 1120, Schedule 40 solvent welded pipe.

Swing joints shall be as detailed on the drawings. Swing joints and all fittings shall be same pipe size as sprinkler body inlet. Pressure pipe risers and fittings shall be PVC Schedule 80.

Risers and fittings for backflow prevention device shall be red brass, standard weight.

212-2.1.3 Plastic Pipe and Fittings. All plastic pipe shall be new normal impact rigid polyvinyl chloride (PVC) 1220 or 1120 pipe extruded from 100 percent virgin materials. All pipe O.D. sizing shall be done in conformance with AWWA iron pipe sizing (I.P.S.). All pipe shall be National Sanitation Foundation approved.

Pipe shall be homogenous throughout, free from visible cracks, holes, blisters, dents, wrinkles, die and heat marks, and foreign materials.

Continuously and permanently mark pipe with manufacturer's name or trademark, kind and size pipe, material, manufacturer's lot number, schedule, or Class and NSF seal of approval.

The physical specifications of the Society of Plastic Industries for each type of pipe used shall be deemed and construed as a part of this Specification.

Pipe dating shall be done in conjunction with records held by the manufacturer for 2 years, covering quality control tests, raw material batch numbers, and any other information required by the manufacturer.

Nominal pipe sizes in I.P.S. and Metric shall be as shown in the table below:

Iron Pipe Size (I.P.S.)	Metric Standard Diameter Nominal (D.N.)
1/2"	15 mm
3/4"	20 mm
1"	25 mm
1 1/4"	32 mm
1 1/2"	40 mm
2"	50 mm
2 1/2"	65 mm
3"	75 mm
4"	100 mm
6"	150 mm

Solvent weld fittings shall be PVC manufacture, heavy wall and of the IPS solvent welded types, Schedule 40. Fittings containing threads shall be Schedule 80.

Primer and solvent cement shall be of the type and make approved by the pipe manufacturer for use on its pipe. Unless noted otherwise by manufacturer, primer shall meet ASTM F-656, and cement shall meet ASTM D-2564.

212-2.2 Valves and Valve Boxes.

212-2.2.2 Shut-Off Valves (S.O.V.) Shut-off valves shall be as specified on the drawings.

212-2.2.4 Remote Control Valves. Remote control valves shall be as specified on the drawings.

212-2.2.6 Quick Coupling Valves and Assemblies. Quick coupling valves shall be two-piece type of the size as specified on the drawings.

212-2.2.7 Valve Boxes.

1. Gate valves. A round plastic or concrete box and locking cover shall be installed over each main shutoff valve in the system and as specified on the drawings.
2. Remote control valves. Provide rectangular plastic or concrete box with locking lid over remote control valves and shall be as specified on the drawings..

212-2.4 Irrigation Heads. Irrigation heads shall be the type(s) called out on the drawings.

212-3 ELECTRICAL MATERIALS

212-3.1 General. All wiring and pull box details shall conform to drawing details, these Specifications and as follows:

- (a) National Electrical Code.
- (b) Local Codes and Ordinances.
- (c) Recommendations as printed by the respective supplier.
- (d) All wiring shall be continuous, soldered and encapsulated in epoxy-filled Rainbird "Snap-Tite" containers or 3M "Scotchlok" containers, at connections to remote control valves.

It shall be the Contractor's responsibility to call out any conflict between the above-listed recommendations.

212-3.2 Conduit and Conductors.

212-3.2.1 Conduit. The first paragraph of Subsection 212-3.2.1 of the Standard Specifications is hereby deleted and replaced with the following:

Conduit shall be PVC 1120, Schedule 40 solvent welded pipe.

Conduit shall be a minimum size as shown in the table below:

Conduit Size	Maximum Number of Wires (#14 AWG)
15mm (½")	2
20mm (¾")	4
25mm (1")	6
32mm (1¼")	10
40mm (1½")	14
50mm (2")	25

212-3.2.2 Conductors. The second paragraph of Subsection 212-3.2.2 of the Standard Specifications is hereby deleted and replaced with the following:

LOW VOLTAGE CONDUCTORS

Pilot lines and common wire connecting remote control valves to automatic controller shall be direct burial, U.F. type with approved 4/64-inch thick waterproof coating, 600 volt, 75 degrees centigrade, copper single-strand wire, U.L. approved.

All "pilot" wires shall be black color. All "common" wires shall be white color.

Wire to moisture sensors shall be orange or blue coated.

212-3.3 Controller Unit. Automatic controller shall be as specified on the drawings.

212-4 ENCLOSURES

212-4.1 General. Materials for enclosures shall conform to Section 206 and fabrication shall conform to Section 304 of the Standard Specifications.

212-4.2 Controller Enclosure. Controller enclosure shall be as specified on the drawings.

---END OF PART 2--

TECHNICAL SPECIFICATIONS

PART 3 CONSTRUCTION METHODS

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING

300-1.1 General. Add:

Demolition and removal of irrigation equipment, turf, root shaving, tree removal, and such other items not mentioned that are required by the Plans and Specifications, are part of this work in this section.

Soil backfill for holes caused by the removal of the existing structures foundations shall be filled with selected site soils and recompacted in 6-inch layers to the density of 95-percent relative compaction.

Tree removal shall include grinding stumps and associated roots to the diameter of the trunk at existing grade and to 3-foot depth below existing grade. Grindings shall be removed from this 3-foot hole. The hole shall then be filled with soil and compacted to 95-percent relative compaction.

All equipment and facilities shown on the Plans to be salvaged, removed and stockpiled, adjusted, and/or relocated shall be measured, marked, and identified in the field.

Contractor shall note the locations, dimensions, and configurations of all existing equipment to be salvaged, and shall clearly mark or tag all equipment to be reused in the field prior to removal to facilitate reassembly; Contractor shall notify Engineer of any damaged or non-salvageable materials **prior** to commencing any removal or grading operations. Materials found to be damaged after the work commences shall be assumed to be the responsibility of the Contractor. Contractor will not be paid for the replacement or repair of facilities or equipment believed by the Engineer to be damaged after the work commences.

Contractor shall replace designated, unusable existing facilities and equipment, in kind, at the direction of the Engineer.

The application of herbicide to kill turf and weeds, shall be per manufacturers' recommendations, including roots; and the removal and disposal of soil and turf

offsite, and such other items not mentioned that are required by the Plans and Specifications, are part of the work in this section.

The last paragraph of Subsection 200-1.1 is hereby deleted and replaced with the following:

Tree branches which hang within 13.5 feet above finished roadway grade or within 9 feet above finished sidewalk or parkway grade shall be removed to the branch collar in accordance with the current pruning standards of the International Society of Arboriculture (ISA). The Contractor shall remove additional tree branches, under the direction of the Engineer, in such a manner that the tree will present a balanced appearance. No paint or tree sealant shall be applied to the resulting scars. All pruning shall be done under the supervision of an ISA Certified Arborist in the Contractor's employ.

The following is hereby added to Subsection 300-1.1: All the root pruning required to place or replace walks, or other permanent facilities shall be limited to the minimum amount necessary to set forms.

All roots 2 inches and larger shall be cut with sharp tool such as axe or chainsaw. No roots shall be broken off by trenching or other heavy equipment.

No root shall be removed within five (5) diameters of the tree trunk measured at 4 feet, 9 inches above grade without the express written permission of the CITY. Any such root removed without the CITY's written permission may create a hazardous condition for which the Contractor shall be liable.

Should the Contractor create a hazardous condition in the sole judgment of the Engineer the Contractor shall remove the tree and replace it with a specimen of the same specie and value at the Contractor's expense.

All significant root pruning (3 inch diameter and larger) shall be performed under the direct supervision of an ISA Certified Arborist in the Contractor's employ.

(See Section 306-1.1 for Trench Excavation requirements).

300-1.3 Removal and Disposal of Material

300-1.3.2 Requirements. The text of Subsection 300-1.3.2(a) and (b) of the Standard Specifications is hereby deleted.

300-1.4 Payment. Add the following:

Full compensation for tree removal shall be considered included in the price bid for the tree/tree well removal bid item, and shall include providing and installing any fill and compaction necessary to make grade at the location of the tree removal.

300-2 UNCLASSIFIED EXCAVATION

300-2.1 General. Unclassified excavation shall consist of all excavation, including roadways, bituminous pavement, and concrete pavement, curb, gutter, and driveways.

For pavement excavation, the contractor shall follow the specifications Appendix II, "Log of Cores and Pavement Removal Schedule", as adjusted by actual field conditions. The logs represent the conditions only at the actual location at the time of exploration. Variations may occur and should be expected between locations. The Engineer reserve the right to make changes based on actual condition. As such, SSPWC Section 3-2.2.2 and 3-2.2.3 (25% increased or decreased quantity unit price adjustment) shall not apply to removal bid Items. The same bid unit price shall apply regardless the actual field quantity.

300-2.1.1 Requirements. Subsection 300-2.1.1 is hereby added to Section 300 of the Standard Specifications as follows:

- (a) Bituminous Pavement. Bituminous pavement shall be removed to neatly sawed edges. Saw cuts shall be to a minimum depth of 3 inches. Where only the surface of existing bituminous pavement is to be removed, the method of removal shall be approved by the Engineer, and a minimum laying depth of 1 inch of new pavement material shall be provided at the join line. Where bituminous pavement adjoins a trench, the edges adjacent to the trench shall be saw cut to neat straight lines before resurfacing to ensure that all areas to be resurfaced are accessible to the rollers used to compact the subgrade or paving materials. Contractor's attention is directed the existence of pavement fabric under existing AC surface. The removal of pavement fabric shall be included in the AC removal cost, under "UNCLASSIFIED EXCAVATION".

- (b) Concrete Pavement. Concrete pavement shall be removed to neatly sawed edges. Saw cuts shall be made to a minimum depth of 3 inches. If a saw cut in concrete pavement falls within 6 feet of a construction joint, cold joint, expansion joint, or edge, the concrete shall be removed to the joint or edge. The edges of existing concrete pavement adjacent to trenches, where damaged subsequent to saw cutting of the pavement, shall again be saw cut to neat straight lines for the purpose of removing the damaged pavement areas. Such saw cuts shall be either parallel to the original saw cuts or shall be cut on an angle which departs from the original saw cut not more than 25 1 inch in each 6 inches. Double sawcuts shall be provided 4 inch depth around all gas meter boxes. The first sawcut shall be 4 inches from the box and the second sawcut shall be 6 inches from the first sawcut.

- (c) Concrete Curb, Walk, Gutters, Cross Gutters, and Driveways, and Alley Intersections. Concrete shall be removed to neatly sawed edges with saw cuts made to a minimum depth of 2 inches. Concrete sidewalk or driveway to be removed shall be neatly sawed in straight lines either parallel to the curb or at right angles to the alignment of the sidewalk. No section to be replaced shall be smaller than 4 feet in either length or width. If the saw cut in sidewalk, or driveway would fall within 30 inches of a construction joint, expansion joint, or edge, the concrete shall be removed to the joint or edge, except that where the saw cut would fall within 12 inches of a score mark, the saw cut shall be made in and along the score mark. Curb and gutter shall be sawed to a depth of 2 inches on a neat line at right angles to the curb face.

The various concrete removal and replace items bid prices shall include the excavation and removal necessary for required base material.

300-2.7 Selected Material. The text of Subsection 300-2.7 of the Standard Specifications is hereby deleted and replaced with the following:

Selected materials encountered in the excavations within the project limits that meet the Specifications for base material, trench bedding, or backfill, topsoil, or other specified materials shall be used as shown on the Plans, in the Specifications, or as directed by the Engineer. Topsoil excavated may be considered only for the purpose of backfilling areas to be planted.

300-2.8 Measurement.

The Unclassified Excavation volume was determined based on information as indicated in the Specifications Appendix II, "Log of Cores and Pavement Removal Schedule". The total Unclassified Excavation quantity in the bid shall be considered to include the following volume of excavation:

The quantity for **Unclassified Excavation** bid item shall be considered a final quantity, and as a base quantity subject to adjustment only by a change in the quantities of the 3 bid items listed above and any change in 1) and 3) of the **Basis of Excavation Areas/Volumes** outlined above. These adjustments will be determined during construction.

Pertinent pavement removal bid items shall be measured based on average thickness of the PCC or AC on PCC removed times the area of removal.

Final payment quantities shall not exceed the theoretical volume of unclassified excavation based on the Plans.

300-2.9 Payment.

The first sentence of Subsection 300-2.9 of the Standard Specifications is hereby deleted and replaced with the following:

Full compensation for all unclassified excavation will be made at the contract unit price bid per cubic yard, as classified in the Bid Schedule, except for items in the Bid Schedule noted as "remove and construct." All unclassified excavation required as part of the work for "remove and construct" items; construction of tree wells; installation of signs; light standards, and similar items; shall be paid for as part of the work of that item, and no additional compensation will be allowed.

300-4 UNCLASSIFIED FILL

300-4.1 General. Subsection 300-4.1 of the Standard Specifications is hereby deleted and replaced with the following:

Unclassified fill shall consist of all fill unless separately designated. Construction of unclassified fill shall include preparing the area on which fill is to be placed, and the depositing, conditioning, and compacting, of fill material.

Rocks, broken concrete, or other solid materials which are larger than 1 inch in greatest dimension shall not be placed in fill areas that are to be planted.

Clods or hard lumps of earth 1 inch or more in greatest dimension shall be broken up before compacting the material in fill areas to be planted. Fill material containing large rocks, boulders, or hard lumps (such as hardpan or cemented gravel which cannot be broken readily) over 12 inches in greatest dimension shall not be incorporated in the fill. Such materials shall be removed from the site.

In landscape areas, the site shall be graded to the limit lines and elevations shown on the drawings with such allowances as may be required for the construction of walks, play areas, and other site improvements. Tolerance for rough grading is 1/10th of a foot, plus or minus, at drainage swales, building pads, and paved areas. At other areas, appearance shall be the governing factor.

Finish grades shall slope to drain without water pockets or irregularities and shall conform to the intent of all plans and sections, after thorough settlement, and compaction of the soil. Finished grades shall meet all existing or established controls of sidewalks, curbs, and walls and shall be of uniform slope and grade between points of fixed elevations or elevation controls from such point to established grades. Tolerance for finish grading is ¼ inch, plus or minus.

Selected material from the site that meets the requirements for Class C topsoil may be used in landscaped areas in the upper 12 inches of fill. (Ref: Sec. 300-2.7)

Make-up fill material in landscaped areas shall be Class A topsoil for the upper 12 inches of fill. (Ref: Sec 308-2)

300-4.5 Placing Materials for Fills. The last sentence of the first paragraph of Subsection 300-4.5 of the Standard Specifications is hereby deleted and replaced without the following:

Each layer spread for compaction shall not exceed 6 inches of compacted thickness.

The third paragraph of Subsection 300-4.5 of the Standard Specifications is hereby deleted.

300-4.9 Measurement and Payment. The text of Subsection 300-4.9 of the Standard Specifications is hereby deleted and replaced with the following:

Full compensation for furnishing all labor, materials, tools and equipment, and doing all the work involved in unclassified fill construction shall be considered

included the associated items of work for which subgrade is prepared and no additional compensation will be made therefor.

Payment for Class A topsoil shall be considered as part of **Miscellaneous Landscaping and Grading** Lump Sum bid items in place and graded to within 1/10th of a foot of finish grade. Measurement shall be at the theoretical volume per Plans.

SECTION 301 - TREATED SOILS, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

Subsections 301-1.6.1, 301-1.6.2, and 301-1.6.3 are hereby added to Section 301 of the Standard Specifications as follows:

301-1.6.1 Adjustment of Water Valve Box Frame, water meter box lid and cover, gas valve box frame and cover, pull box lid and cover, and survey monument lid and cover. Subsection 301-1.6.1 is hereby added to Subsection 301-1.6 of the Standard Specifications as follows:

Pull box lid and cover, water meter box and cover, and survey monument lid and cover within the area to be paved or graded shall be set to finish grade by the Contractor as required by the Plans and Specifications.

Gas meter will be adjusted to grade by utility companies. Contractor shall provide any minor adjustments to grade at time of PCC forming, with any associated costs to be included in other items of work.

Contractor shall coordinate his work and provide notification as necessary to allow for adjustment to grade or replacement of utility facilities where such work is to be performed by the utility company.

Adjustment of slip can type frame and covers to grade shall be the responsibility of the Contractor. Utility companies will be responsible for checking and ensuring that such frame and covers do slip properly, such that the Contractor can slip them to grade at time of paving. Payment for slipping to grade shall be included in the prices bid for other items of work. The exact number of such frames and covers may vary from the number shown on the plan, but it is the responsibility of the Contractor to survey the project and include the cost of all such adjustments in the bid. Contractor shall notify the Engineer at the earliest possible time after discovery if a frame and cover does not slip.

Immediately after execution of contract documents, Contractor shall inspect all utility boxes between curb and right-of-way line to inventory any damaged boxes. The utility companies have previously inventoried damaged boxes. Contractor shall attend a meeting at the site with the utility companies and the Engineer to resolve any discrepancies between the two

inventories. After excavation of the parkway area, utility companies will replace all pre-existing damaged boxes. Any boxes damaged after start of excavation will be provided by the utility companies with associated costs to be assessed to the Contractor.

301-1.6.2 Adjustment of Los Angeles County Sanitation District Manhole Frame and Cover sets to Grade. Los Angeles County Sanitation District manhole frames and covers shall be set to finish grade as follows:

1. Contractor shall notify the District's Superintendent of Maintenance, (310) 638-1161 or (310) 774-7270, 48 hours prior to commencement of any work in the area of the manhole.
2. If grade over manhole is to be lowered:
 - a. Contractor shall furnish and deliver a temporary steel cover plate of thickness and size approved by the District for said manhole.
 - b. Contractor shall excavate around the manholes to a depth and distance outside of the manhole as required by the District for said manhole.
 - c. District shall remove the existing manhole frame and cover and any interfering portion of the manhole shaft and shall place the steel cover plate over the manhole.
 - d. Steps (e) through (g) of 2 above shall be followed, except that if grade is to be raised more than 2 feet, the Contractor shall excavate around the manhole shaft under step (2) to a depth and diameter as necessary for the District to remove and reconstruct manhole shaft with required taper and as specified by the District.

301-1.6.3 Adjustment of Los Angeles County Flood Control District Manhole Frame and Cover Sets to Grade. Adjustments to grade of Los Angeles County Flood Control District Manhole Frame and Cover sets do not require a District permit. However, the Contractor shall notify the Inspection Department at (626) 458-3129, 24 hours in advance of any work in the area of the manhole.

301-2 UNTREATED BASE

301-2.1 General. Where the words aggregate base(s) appear it shall mean untreated base material(s).

After the excavation and removing of existing AC pavement and other material to the approximate grade for PCC thickness as shown on plans, the Contractor shall randomly perform exploratory excavations to 8 inch depth in the remaining aggregate base at locations as directed by the Engineer nominally on a 30x10 foot grid and report to the Engineer any depths less than 8 inches to subgrade below the aggregate base. As indicated on the specifications Appendix II, "Log of Cores and Pavement Removal Schedule":

If there is sufficient depth of un-yielding compacted existing base material as determined by the Engineer, the Contractor shall grade and proof compact the existing material to be ready for PCC pavement. The cost for re-compaction of existing base material shall be considered included within the bid prices for various PCC Pavement or other flat work.

If there is not sufficient depth of un-yielding compacted existing base material as determined by the Engineer, the Contractor may be directed to remove the existing base and native sub-grade to proper depth, compact the subgrade, and reinstall the stockpiled base material to 95% of compaction.

If there is no aggregate base remaining, the contractor shall excavate to the proper depth, grade and compact native soil, and import and compact existing material and new base material to be ready for PCC pavement.

The contract bid item for **Crushed Miscellaneous Base (CMB)** shall include all labor, work and materials necessary to remove, dispose and construct CMB complete in place. The work shall include subgrade preparation, base placement, grading, compaction, and all other work necessary to construct CMB complete in place. Crushed Miscellaneous Base shall conform to the provisions of Section 200-2 and Section 301 of the Standard Specifications.

Crushed Miscellaneous Base shall include all CMB placed as base to the reconstruction areas, curb and gutter, cross gutter, drive approaches, and slot patches. This item shall include for placement, grading and compaction of the CMB to 95% relative compaction.

PAYMENT

Payment for **Crushed Miscellaneous Base (CMB) Bid Item** shall be at the contract bid item price per cubic yard (CY) and shall include full compensation for all labor, materials, tools equipment, transportation and incidentals necessary to remove existing and do all the work involved thereof, provide and install new base material, complete, in place, and accepted.

SECTION 302 - ROADWAY PAVEMENT AND SURFACING

302-5 ASPHALT CONCRETE PAVEMENT

302-5.1 General. The last sentence of Subsection 302-5.1 of the Standard Specifications is hereby deleted and replaced with the following:

302-5.4 Tack Coat. Tack coat for joints on trenches shall be uniformly applied at 0.2 gallons per square yard PG 64-10 or two coats SS-1h applied uniformly at 0.2 gallons per square yard each coat, the second coat to be applied after “break” of first coat.

Tack coat material for overlay shall be PG 64-10 applied at a rate of 0.05 gallons per square yard applied at a minimum of 350 degrees Fahrenheit from a distributor truck with a functioning heating element capable of raising the temperature by 3 degrees Fahrenheit per hour.

Tack coat shall not be placed so far ahead of paving that the tack coat is tracked away by trucks from more than 20 percent of the tacked area.

302-5.5 Distribution and Spreading. Contractor shall provide automatic screed control as directed by Engineer.

Joints shall be placed within 6 inches of a lane line unless otherwise specified.

At bowouts, the paving machine shall realign as needed such that joints are maintained per plans and specification.

Joints in the finish course of AC shall not fall within 9 inches of joints in base paving, except along lines aligning with joints adjacent to medians.

Finish course shall be B-PG 64-10.

302-5.6 Rolling. Rolling along a joint shall be such that the widest part of the roller is on the hot side of the joint.

Rolling along a joint shall be such that the widest part of the roller is on the hot side of the joint.

Three rollers shall be provided for installation of AC greater than 200 tons per hour, regardless of thickness.

302-5.8 Manholes (and Other Structures). Manhole patch material shall be C2 PG 64-10.

Leveling course paving shall be placed as soon as possible (not later than 48 hours) after the pavement grinding to avoid weakening the remaining existing structural section. The contractor will be responsible damage to the remaining pavement due to such prolonged lapse. AC leveling course shall be D2-PG 64- PAYMENT

Payment for **Asphalt Concrete (AC) Pavement: Full Depth, Variable Depth, or Leveling Course** bid items shall be at the contract bid item price per ton (TON) and shall include full compensation for all labor, materials, tools, equipment, transportation, and incidentals necessary to do all the work involved thereof, complete, in place, and accepted.

COLD MILL (GRINDING) AND REMOVE VARIABLE THICKNESS EXISTING PAVEMENT

Cold milling shall conform to the provisions of Section 302 of the Standard Specifications, and shall be performed at locations and to depths corresponding to the plans and/or directives by the City Engineer. Cold milling in general shall be performed from edge of gutter (or curb, if there is no gutter) to the specified width and depth.

The Contractor is required to use smaller grind machines in cold mill areas that are inaccessible to the larger machine and around existing manhole, vaults or valve cans

All materials to be removed shall be disposed of outside of right-of-way as specified in subsection 300-1.3.1 of SSPWC. Existing paving fabric, if encountered, shall be cut and removed. The cost for removing existing asphalt with paving fabric shall be included in the unit price for cold milling.

Transverse header grind shall be 50 feet wide, as shown on plan, to meet existing grade.

Due to variable thickness of pavement cold milling depths, this bid item shall be measure as **per square foot** of material cold milled and removed. The amount to of each type of pavement/subgrade cold milled (asphalt or base) shall be measured together, no additional compensation is allowed for the various material cold milled or removed.

302-6 PORTLAND CEMENT CONCRETE PAVEMENT

Portland cement concrete pavement shall conform to Section 40 of Caltrans Standard Specifications, except as noted on plans and as modified herein.

Portland cement concrete shall achieve minimum flexural strength of 450 psi (for a equivalent of 2,500 psi compressive strength) in 72 hours. The Contractor may propose an alternate design(curing time, flexural strength) for consideration by the Engineer.

Longitudinal and transverse joints shall be constructed as shown on the plans. Alternate joint plans shall be subjected to the Engineer's approval.

Placement of PCC pavement by other than machine methods will be limited to 50 square yards without prior approval by the Engineer.

Finished surface shall subject to straightedge test. Non conforming finished PCC pavement surface shall be profiled and grinded to the required Profile Index by the contractor at his expense at no additional cost to the city.

When yielding subgrade is encountered, PCC Pavement may be placed on 8-inches of CMB over geotextile engineering fabric on compacted native.

The decorative crosswalk sawcut pattern shall be terminated such that the saw does not enter into the area of the edge band of the crosswalk.

Joint filler shall be Sikaflex®-15 LM SL Grade or approved equal.

40-1.13 MEASUREMENT. Portland Concrete Pavement shall be measured by square feet.

40-1.14 Payment for all removal and construction involving **PCC/Concrete pavement bid items or otherwise** shall be considered to include full compensation for grade preparation(including proof grading and compaction of existing base), mixing design, forms, grades, PCC pavement, curing, finishing and all labor, equipment, materials and incidentals complete in place and no additional compensation will be provided therefor.

Construction joint shall be included as part of PCC pavement square footage price.

SECTION 303 - CONCRETE AND MASONRY CONSTRUCTION

303-1 CONCRETE STRUCTURES

303-1.11.1 Variation of Depth of Catch Basin and Connector Pipe. Subsection 303-1.11.1 is hereby added to the Standard Specifications as follows:

In order to assist in avoiding utilities, or for other reasons deemed necessary by the Engineer, the AGENCY reserves the right by direction of the Engineer to increase or decrease the depth of any catch basin from that shown on the drawings. If the "V" depth is increased or decreased by 1 foot or less, no adjustment or price bid will be made. If the "V" depth of a catch basin is increased or decreased by greater than 1 foot, by order of the Engineer, then an adjustment (greater or less than the price bid) for the increase or decrease will be made and the amount thereof will be based upon the method stipulated hereinafter; furthermore, any increase or decrease

in cost of constructing the connector pipe resulting from the "V" change, or of the catch basin due to thickening of the concrete section or addition of steel reinforcement shall be included in said stipulated amounts. Determination of these stipulated amounts involves the exclusion of all metal work and reinforcing steel not necessary to the increase or decrease of the catch basin "V" depth. Such exclusion is accomplished by the factors .80, 0.48, and 0.55 used in the stipulated formulae below. If the adjustment is an increase in the total amount of money due to the Contractor, then the Contractor will be paid for such increase, in the same manner as Extra Work, as provided for in Section 9-3. If the adjustment is just a decrease in the total amount of money due to the Contractor, then the AGENCY will be entitled to and shall receive a monetary credit from the money due to the Contractor.

For purpose of these Specifications, catch basins are separated into three groups; namely, Group 1, side opening catch basins without grates and with the deepest and shallowest points of the catch basin not varying in depth by more than 6 inches; Group 2, side opening catch basins without grates and with the deepest and the shallowest points of the catch basin varying by more than 6 inches in depth; and Group 3, grating type catch basins.

For the purpose of these Specifications, the average depth will be the mean of the "V" depth of all the catch basins under one particular item of work.

In addition to the work listed in the Schedule of Prices, the Contractor agrees that, if directed by the Engineer, he will either increase or decrease the "V" depth of any given catch basin and that the amount to be paid to the Contractor or credited to the AGENCY therefor shall be based upon the following stipulated method:

<p>Group 1 <u>(Bid Price) (0.80)</u> Average Depth on Which Bid was Based</p>	=	<p>Adjustment per foot change in average depth as ordered by the Engineer</p>
<p>Group 2 <u>(Bid Price) (0.48)</u> Average Depth on Which Bid was based</p>	=	<p>Adjustment per foot change in average depth as ordered by the Engineer.</p>
<p>Group 3 <u>(Bid Price) (0.55)</u> Average Depth on Which Bid was based</p>	=	<p>Adjustment per foot change in average depth as ordered by the Engineer.</p>

Payment for **Catch Basins, Local Depression, Junctions and Transition structures, PCC collars** shall be made at the bid prices of each item and shall include full payment for furnishing all labor, materials, and all other work necessary to construct said concrete drainage structures.

303-4 MASONRY CONSTRUCTION

Masonry construction shall conform to Subsection 303-4 of the Standard Specifications and these Special Provisions. All brick and mortar bulkheads shall be double row.

Payment for brick and mortar bulkheads for junction structures and pipes shall be included in the price paid for other items of work involved and no separate payment shall be made therefore.

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, AND DRIVEWAYS

303-5.1 Requirements.

303-5.1.1 General.

All PCC flat work (except sidewalk) under this subsection shall be constructed over compacted 6" CMB.

Concrete areas behind sidewalks and driveways shall be considered as walks.

All median curb and gutter shall conform to the Modified Median Curb and Gutter Detail in the Appendix, except as directed by the Engineer.

Contractor shall block out full sidewalk panels around utility, traffic, or communications pull boxes not replaced at time of PCC pour, existing street lights and traffic signal poles and equipment to be replaced, and likewise around new foundations, and in any case where new poles are not fully functional at time of sidewalk pour. It shall be assumed that new street light poles will be installed after sidewalk is poured. At the appropriate time Contractor shall pour in the blockouts.

The contract bid item for all PCC flat work shall include include sawcut, removal and disposal of existing materials, subgrade preparation, formwork, concrete material, curing, protection, adjustments to match existing improvements and all other work necessary to construct the work complete in place. The contract bid item for sidewalk or curb ramp shall include saw cutting, complete in place, including detectable warning surface and monolithic retaining curb 8 inches maximum as necessary.

Detectable warning surface (truncated domes) shall be Armorcast detectable warning tiles and color "Brick Red" (Armorcast Products Company, 13230 Saticoy Street, North Hollywood, CA 91605 Phone: 818.982.3600) or approved equal, and shall conform to SSPWC specifications. Tiles shall be cut to fit the radius. Installation shall conform to manufacturer's recommendations. The base for detectable warning surface dome tiles shall be minimum 4 inches thick PCC.

Detectable warning surface (truncated domes) shall be included in ramp bid items, except for installation in existing ramps for which the bid item shall be considered to include sawcut, removal and excavation, base PCC under tiles and full installation of tiles in conformance with manufacturers recommendations.

The work shall include removal of existing curb ramps, adjacent sidewalk and curb, and gutter, subgrade preparation, formwork, concrete material, curing, protection, and all other work necessary to construct the work complete in place. New sidewalk and new curb ramps must match in pattern as directed.

For detectable warning surface to be installed in existing curb ramp, the PCC surface shall be sawcut and removed and shall be wet-set to be flush with surrounding surfaces.

Integral retaining curbs shall be constructed at the back of curb ramps as necessary to match existing landscape grades. Retaining curbs as necessary shall be included in this bid item. Ramps shall be constructed to Greenbook standard plans modified as necessary to match field conditions and shall meet all ADA requirements.

Irrigation System Restoration for PCC flat work

In areas where irrigation systems exist, they shall be protected in place or removed and replaced in-kind if damaged during construction. This work shall be done on the same day the system is damaged so that no damage is done to any landscaped areas due to lack of water. No additional payment will be made under this bid item for this work.

Landscaping Restoration for PCC flat work

Any grass or landscaping that is removed shall be replaced like for like with soil treatment per admixtures approved by the City Engineer or his designee. All grass shall be replaced in kind. Where existing landscaping areas consist of other than grass, the Contractor shall provide before and after digital close-up pictures (taken within 10 feet with copies to the Contractor and City Engineer or his designee of all sites to verify proper replacement of existing landscaping and landscape material). Contractor shall be responsible for 30-day maintenance period for re-establishment of any plant material. Said maintenance period shall commence on the day of the City Engineer or his designee accepts the Landscaping planting. No additional payment will be made under this bid item for this work.

303-5.2 Forms. Add the following:

303-5.2.3 Formwork Inspection. The layout for formwork shall be inspected prior to construction of forms. The Engineer may direct changes in line and grade to avoid interference with existing tree root system or facility placement.

Forms shall be inspected and approved in writing by the Engineer prior to placing any concrete.

303-5.9 Measurement and Payment.

Subsection 303-5.9 of the Standard Specification is hereby deleted and replaced with the following:

Payment for removal and construction of **concrete curbs, retaining curb, gutters, sidewalk, local depressions, cross gutters, and driveways** shall be made at the unit price of the bid items as called out in the Bid Schedule, and shall include full compensation for all labor, materials, saw cutting, tools equipment, transportation and incidentals necessary to do all the work involved thereof, including irrigation and landscape restoration, complete, in place, and accepted. Placement of concrete at blockout location shall be paid at the same bid item price as for surrounding the blockout area (as applicable).

Detectable warning surface for new curb ramp shall be included as the per curb ramp bid price. Detectable warning surface for pedestrian islands and existing curb ramps shall be paid for each location installed as shown on plans.

All excavation and removal of existing material for 6" CMB under PCC flat work (except sidewalk) shall be paid under various PCC items of work for which it is performed. All CMB installed shall be paid under bid item CMB per cubic yard (CY).

Payment for **removal and construction of curb drain, removal of existing grate inlet, as well as the furnishing and installation of metal beam guardrails, chain link fence** shall be per their individual units as listed in the Bid Schedule. They shall include full compensation for all labor, materials, saw cutting, tools equipment, transportation and incidentals necessary to do all the work involved thereof.

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS, EXCAVATION, BEDDING AND BACKFILL

This section shall conform to Subsection 306-1 of the Standard Specifications and these Special Provisions.

When the actual elevation or portion of any existing pipe, conduit or other underground appurtenances cannot be determined without excavation, the Contractor shall excavate and expose the existing improvement (pothole) at the location shown on the Plans and any other locations deemed necessary by the Engineer. The pothole shall be done at least 2 weeks in advance of the pipe installation to identify any potential conflicts so that the necessary adjustments can be made.

The first sentence of the first paragraph of Subsection 306-1.1.2 of the Standard Specifications is hereby deleted and replaced with the following:

Except by permission of the Engineer, the maximum length of open trench where prefabricated pipe is used shall be the distance necessary to accommodate the amount of pipe installed in a single day. All trenches shall be backfilled or covered with steel traffic plates at the end of each working day.

If, in the opinion of the Engineer, the trench subgrade is wet, contaminated or contains unsuitable material due to no fault of the Contractor, the Contractor shall over excavate to a depth determined by the Engineer and place aggregate base as directed by the Engineer. Payment shall be made in accordance with Sub-Section 3-3 of the Standard Specifications.

The last two paragraphs of Subsection 306-1.1.3 of the Standard Specifications are hereby deleted.

The seventh and eighth paragraphs of Subsection 306-1.3.1 of the Standard Specifications are hereby deleted and replaced with the following:

Rocks greater than 4 inches in any dimension will not be permitted in backfill placed between 1 foot above the top of any pipe or cast- in-place structure box and 1 foot below pavement subgrade.

Installation of storm drain or curb drain pipe shall be according to Sub-Section 306-1.2 and City Standard Plan 1150C.

Subsection 306-1.3.3 is hereby deleted and replaced with the following:

Compaction of backfill by flooding or jetting will not be allowed.

Trench bedding and backfill shall be accomplished in accordance with the details shown on the plans, geotechnical recommendations, and shall consist of import sand bedding and backfill up to pavement subgrade. Placing backfill uniformly on all sides shall mean limiting the differential fill level to two feet or less.

The second, fourth and fifth paragraphs of Subsection 306-1.5.1 of the Standard Specifications are hereby deleted and replaced with the following:

Payment for all materials used by the Contractor or ordered to be placed by the Engineer, including that used to maintain the temporary resurfacing until the permanent resurfacing is placed, will be considered to be included in the other items of work.

The text of Subsection 306-1.6 of the Standard Specifications is hereby deleted and replaced with the following:

Pipe and conduit shall be measured along the longitudinal axis between the ends as laid and shall include the actual pipe in place and shall not include the inside dimensions of structures. Catch basin lateral shall be measured from the inside to the inside face of conduit or structure to which connection is being made.

It is the Contractor's option to take his own core samples to verify the existing conditions.

The price per linear foot for pipe and conduit in place shall be considered full compensation for all materials, labor, equipment, tools and incidentals for doing all the work including the removal of interfering portions of existing storm drains, curb drains and improvements; the closing or removing of abandoned conduit and structures; the excavations of the trench including bituminous pavement; the control of ground and surface waters; the preparation of subgrade; potholing; placing and joining pipe; bedding and backfill; temporary resurfacing; deep lift asphalt concrete pavement for permanent resurfacing; clean up; providing as-built plans and all other work necessary to install the pipe or conduit, complete in place and no additional compensation will be allowed therefore.

Full compensation for bedding and backfill for **reinforced concrete pipe conduit**, including trenching for shoring purposes, shoring, and bracing as required shall be considered as included in the Contract unit price bid per linear foot of storm drain pipe items and no additional compensation will be allowed therefore.

Shoring and Braced Excavation shall comply with Subsection 306-1.1.6 of the Standard Specifications. The last sentence of the fourth paragraph shall be hereby deleted and replaced with the following:

SUPPORTS FOR CONDUITS ACROSS TRENCHES

Protect in place existing utilities as indicated on the Plans or directed by the Engineer and maintain the utility service. The locations of existing utilities are approximate and some depths are unknown. The Contractor shall pothole and verify ALL existing utilities ahead of construction operations. Upon learning of the existence of any utility omitted from or shown incorrectly on the Plans, the Contractor shall notify the Engineer immediately. Damaged utility facilities shall be repaired at no additional cost.

The Contractor shall not interrupt the service function or disturb the support of any utility without authority from the owner or order from the Engineer. All valves, switches, vaults, and meters shall be maintained readily accessible for emergency shutoff.

Where protection is required to ensure support of utilities located within the project limits whether or not they are shown on the Plans, the Contractor shall, unless otherwise provided, furnish and place the necessary protection at its expense. The Contractor shall take special precautions when compacted around the utility to ensure that no voids exist.

TEMPORARY PAVING

All trenches shall be backfilled and have temporary pavement installed or covered with steel traffic plates at the end of each working day.

Within four consecutive calendar days following installation of the conduit, or after compaction is approved by the Engineer, whichever comes first, steel traffic plates shall be removed and two inches of temporary pavement installed.

Cross streets are to be paved with temporary pavement on the same day that excavation and backfill are completed. Temporary pavement shall be maintained so that a smooth traversable surface is available at all times for vehicular traffic, free from ruts, depressions, holes, and loose gravel. Temporary paving shall be removed and disposed of by the Contractor before the permanent resurfacing is placed. Payment for construction and maintaining temporary pavement shall be included in the price bid for other items of work, and no additional allowance will be made therefore.

The contractor shall construct temporary asphalt concrete with a slope of 1:1 at the edge of open excavation (remove and reconstruct section) if all the following occur:

1. Clearance between travel lane and open excavation is less than five (5) feet
2. Excavation depth is four (4) inches or deeper, and
3. If open excavation will last more than 24 hours

Payment for construction and maintaining temporary pavement shall be included in the price bid for other items of work, and no additional compensation will be made therefore.

VIDEO INSPECTION

Video inspection shall be performed on the newly constructed storm drain pipes.

The scope of work includes the recording images, Digital Versatile Disc (DVD) format, all connections and lateral locations by footage or stationing, and providing the AGENCY with a hard copy of the findings. Contractor's proposed log format shall be approved by the Engineer.

During inspection, the operating technician shall provide, in addition to his/her image recording (with audio), record of conditions, log in writing the location of all defects, misalignments, and other conditions and data pertinent to the physical condition and operation of the storm drain. Conditions, defects and laterals shall be located by footage counter.

At all points within the storm drain where defects are shown, the Contractor shall stop the camera, rotate (up to 360°), and/or tilt the camera lens to ensure adequate video coverage.

The camera shall be stopped and/or backed up to view and analyze conditions that appear unusual or uncommon to a storm drain in good condition. There shall be no loss of video quality at any time.

Payment for Video inspection shall be considered included in bid unit price per linear foot of reinforced concrete pipes with full compensation for doing all appurtenance work, including furnishing all materials, labor, equipment, tools, traffic control and incidentals to accomplish the work, and no additional compensation will be allowed therefore.

DEWATERING

The Contractor shall provide and maintain at all times during construction ample means and devices with which to promptly remove and properly dispose of all water from any source entering the excavations or other parts of the work. Dewatering shall be accomplished by methods, which will ensure a dry excavation and preservation of the final lines and grades of the bottoms of excavations. The methods may include sump pumps, deep wells, well points, suitable rock or gravel placed below the required bedding for draining and pumping purposes, temporary pipelines, and other means. The Contractor shall protect all trench work, storm drain construction and sub-surface structures from rain damage and surface runoff.

The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property.

Conveyance of the water shall be such as to not interfere with traffic flow or treatment facility operations. No water shall be drained into work complete or under construction without prior consent of the Engineer.

Payment for complying with all provisions of this section shall be considered to be included in the various items of work involved and no additional compensation will be allowed therefore.

CATCH BASINS

Catch Basin, types and widths per plan shall be per referenced Standard Plan 302, with local depression conforming to referenced Standard Plans, and shall be constructed at locations shown on the plans.

Full compensation for conforming to the requirements of Catch Basins including:

1. Furnish all labor, tools, equipment, and materials necessary for accomplishing work complete and in place,
2. Excavation,
3. Fill
4. Reinforcing Steel,
5. Manhole Frame & Cover,
6. Local Depression
7. Removing existing curb, gutter, and sidewalk
8. Reconstruction of monolithic curb

Shall be considered as included in the unit price per **each** Catch Basin and no additional compensation will be allowed therefore.

REINFORCED CONCRETE PIPE

REINFORCED CONCRETE PIPE shall conform to Subsection 207-2, "Reinforced Concrete Pipe," and Subsection 306-1, "Open Trench Operations," of the Standard Specifications, these Special Provisions, and as directed by the Engineer.

REINFORCED CONCRETE PIPE shall be of the size and strength designated as shown on the plans and as listed in the Proposal.

All work necessary for any given length of pipe placed, including excavation, bedding, pipe placement, backfill and temporary resurfacing, shall be accomplished during the same working day.

Bedding for the REINFORCED CONCRETE PIPE shall conform to Standard Plan 1150C, and as specified on the plans and in the geotechnical report.

Bedding placed in excess of the limits shown on Standard Plan 1150C and for the convenience of the CONTRACTOR shall not be subject to any additional compensation.

Compaction equipment or methods which may cause excessing displacement or may damage structures, such as sleeve tapers or other drop-weight type equipment, shall not be used.

Full compensation for conforming to the requirements of REINFORCED CONCRETE PIPE including:

1. Excavation,
2. Furnishing and laying pipe
3. Collars
4. Bedding per Standard Plan 1150C and Contract plans
5. Backfill
6. Bracing and protecting existing unidentified utilities, not otherwise shown on the plans or these Special Provisions
7. Placing and removal of temporary AC surfacing in roadway areas
8. All other labor, equipment, and material incidental to the pipe,

shall be considered as included in the CONTRACT unit price per linear foot (LF) for REINFORCED CONCRETE PIPE (size as noted) and no additional compensation will be allowed therefore.

JUNCTION STRUCTURE AND CONCRETE COLLAR

Cast-in-Place concrete shall conform to the provisions of Section 201 and Section 303-1 of the Standard Specifications and these Special Provisions.

Portland Cement Concrete for the transition structure shall be Class 565-C-3250P.

Testing of the concrete shall be done in accordance with Section 201-1.1.4 of the Standard Specifications. The result of any testing that does not meet the requirements shall be the rejection of the structure by the CITY, and the structure shall be reconstructed by the Contractor at no cost to the CITY.

Junction structure, concrete collar and bedding shall be constructed in accordance with referenced Standard Plans and these plans. The unit price per each for junction structure and concrete collar in place shall include full compensation for furnishing all materials, labor, equipment, tools and incidentals for the concrete, reinforcing steel, shop drawings, provide as-built plans, excavation of the trench, including bituminous pavement, the control and removal of ground and surface waters, the preparation of subgrade, bedding, structural backfill form work shoring, potholing, temporary resurfacing, deep lift asphalt concrete pavement for permanent resurfacing, clean-up, and all other works necessary to construct the conduit, complete in place and no additional compensation will be allowed therefore.

The price per linear foot for pipe and conduit in place shall be considered full compensation for all monolithic catch basin connections shown on the Plans; the excavations of the trench, temporary and permanent resurfacing; replacement of the affected portion of curb and gutter, cross gutter, and sidewalk; the control of ground and surface waters; the preparation of subgrade; potholing; placing and joining pipe; bedding and backfill, compaction; the reconstruction of interfering surface improvements; temporary resurfacing, removal of trees, clean up; and all other work necessary to install the pipe or conduit, complete in place.

When it is necessary to lower the invert elevation of a pipe by 1 foot or less or raise the invert elevation any amount, no increase or decrease in the unit price bid for such pipe will be made.

SECTION 307 - STREET LIGHTING AND TRAFFIC SIGNAL SYSTEM

Add new Section 307-21 LANDSCAPE ELECTRICAL SYSTEMS

307-21 LANDSCAPE AND ELECTRICAL SYSTEMS

307-21.1 General. The intent of the drawings is to describe complete systems, and the Contractor shall furnish and install all components required to provide complete operating electrical systems.

Contractor shall remove, salvage, store and re-install light pole. See Plan for new location. Installation shall be in kind, including foundation and mounting plate. All work shall be per manufacturer's written instructions. Contractor shall be

responsible, and at Contractor's expense, for foundation design and required calculations.

The following is a brief list of the electrical work to this Contract for the installation of equipment as listed below. The work shall be complete as described in the specifications and shown on the drawings, and shall result in complete operating electrical systems for the purpose intended.

Furnish and install all material, labor, and equipment necessary for complete, operating electrical systems, except as noted otherwise. The following list shall not be considered as a complete and detailed list of work and materials to be supplied, but shall be used as a guide:

- Underground distribution conduit, cable, and pull boxes.
- Shop drawings, material submittals, and work schedule.
- Connections to all work of other trades.
- Record drawings and guarantees.
- Excavation, backfill and compaction for trenches, and pull boxes.
- Disposal of excess earth.
- Repair all damage to existing facilities caused by this work.
- Apply for and obtain all necessary permits and building department inspections.

All materials and equipment shall be installed in a secure, neat and workmanlike manner by competent workmen, and any item not so installed shall be corrected to meet the complete approval of the Agency. If, at any time, the Contractor believes that he cannot secure proper results through the use of the materials and procedures specified, he shall immediately notify the Engineer and the Agency setting forth his reasons.

The Contractor assumes all responsibility for materials, storage, damage to equipment, and safety for all personnel and the public, until final acceptance by the Agency. Sensitive electrical equipment should not be installed until major construction work is completed. During and after installation, equipment shall be protected from damage by water, dust, paint, wet concrete, plaster, etc. Adequate barricades and lighting shall be provided for allowing trenches and excavations.

Drawings – Performance. All scale dimensions are approximate. Before proceeding with any work, the Contractor shall check and verify all locations and dimensions of equipment at the site of work.

All work specified, but not clearly defined by the drawings, must be installed as directed by the Engineer in a manner satisfactory to him. Work covered by notes on drawings must be furnished and installed, whether or not it is specifically mentioned in the Specifications.

The Contract Drawings indicate the extent and general arrangement of the new and existing equipment, conduit, and wiring systems, and are essentially diagrammatic. The drawings indicate the required sizes and points of termination of conduits and wires and routes to avoid obstructions and provide clearance; however, it is not the intention of these drawings to show all necessary offsets, etc., and it shall be the responsibility of the Contractor to install all of his work to specific conditions found on the site.

All changes from the drawings necessary to make the work conform to existing structures or substructures, or to fit the work of other trades, or to conform to laws and ordinances; and all other reasonable changes and adjustments in locations of equipment, etc., prior to the installation, shall be made at no additional expense to the Agency.

Schedule of Work. The Contractor shall schedule his work and shall coordinate with the Agency and all other contracts in progress on the site at all times. Necessary coordination will be specified during the preconstruction conference.

Contractor shall submit a complete work schedule at the preconstruction conference.

Trenching shall avoid, to the extent possible, damage to existing tree roots. Routing of trenching shall be approved by the Engineer 24 hours prior to trenching.

307-21.2 Trenching and Conduit Work. Trenching shall be coordinated with the irrigation system.

All irrigation lines damaged during prosecution of the work shall be repaired in compliance with the standards in Sections 212 and 308 of the STANDARD SPECIFICATIONS.

PVC conduit shall be laid properly and secured.

Provide warning tape at 6 inches below grade.

PVC conduit shall be 24 inches below grade. Backfill shall be placed in 6-inch layers, hand or mechanically tamped to 90 percent compaction. Flooding will not be permitted without the specific approval of the Engineer, and then only for the area approved. Backfill shall contain no rocks, broken concrete or trash.

Trenches shall be backfilled level with surrounding grades when fully compacted. Trenches in lawn areas shall be sodded in accordance with Section 308-4.8(c) of the STANDARD SPECIFICATIONS; sod type shall be approved by the Agency.

307-21.3 Pull Boxes. Install pull boxes where noted on drawings. No pull boxes shall be located in an athletic field area, or where it will pose a hazard to the using public.

Boxes shall be set flush with sidewalk or other paving. In lawn areas, set boxes 1-inch above finish grade, or as noted on plans. Notes on plans govern.

Concrete boxes shall be made in sections, and grouted or cemented together to form a watertight seal. Boxes shall have a 6-inch drain hole in the bottom. Boxes shall sit on 24-inch deep crushed clean 1-inch rock. The drain hole shall be opened and cleaned out before sealing the top. Top shall be sealed after inspection, and the entire box made watertight. Pre-cast pull boxes by Brooks or Christy may be submitted for approval.

307-21.4 Splicing and Cable Identification. No splices are permitted except in pull boxes or in pole base at hand hole.

All cable splices shall be made with ILSCO or 3M compression type crimp connectors (not bolted mechanical compression type).

All joints shall be made waterproof by two layers of rubber tape (Scotch No. 70) followed by two layers of 2-lap friction tape (Plymoth ASTM), covered by three layers of 2 lap No. 88 Scotch tape. Splices in underground boxes shall be made with splice kits as manufactured by 3M Company, Scotchcast #72 for inline and #78 for tap splices or equal.

Branch circuit splices in fixture shall be soldered and taped as noted above. Compression fittings (uninsulated "Scotchlok") may be substituted for solder, but must be taped, dipped in waterproof compound and made waterproof. Insulating "Scotchlok" may be used, but only with waterproof Unipack Scotchcast resin.

All cables shall be identified with a punched plastic tag, such as color-coded Dymo tags, in each pull box by circuit number, voltage, and phase.

307-21.5 Connections to Equipment or System. The Contractor shall connect to equipment furnished under other sections of the specifications where noted on drawings.

307-21.6 Grounding. Do not use water supply pipe as a ground. All fixtures shall be connected to system ground. Neutral to ground shall not exceed five ohms. Connect fixture to ground with No.10 TW wire. All rigid galvanized steel conduit shall be properly grounded. Use proper ground clamps and conduit fittings to ground cable and conduit to ground rods. Size, as required by Code.

Concrete: All concrete shall be 3000 psi and shall be ready mixed concrete, conforming to UBC Standard 26-13. Alternate 2 of Standard 26-13 shall be the basis of quality, and Items 1 through 4 are specified elsewhere in this section.

Packing: Cement shall be packed in strong paper or jute sacks with the brand and name of the manufacturer plainly marked thereon.

Aggregates: The grading of coarse aggregates for slabs shall be the 1-inch to No. 4 range as set forth in Table 26-2-A of UBC Standard 26-2. Grading of coarse aggregates for all other concrete shall be the ½-inch to No. 4 range of the same Table 26-2-A.

307-21.8 Cleaning Equipment and Materials. The Contractor shall thoroughly clean all fixtures, exposed piping, apparatus, and equipment installed under its Contract. Parts which are to be painted shall be thoroughly cleaned of cement, plaster, etc., brushed with steel brush to remove rust, etc., clean and painted.

All dirt, rubbish, paint spots, or grease on walls, walks, poles, equipment, or fixtures, for which the Contractor is responsible, shall be removed by the Contractor and the premises left in first-class condition in every aspect.

All rubbish resulting from the work shall be cleaned up and removed from the site by the Contractor; also from time to time during construction, and when so directed by the Engineer.

307-21.9 Tests. The Contractor shall make all tests required by the Engineer, or other authorities having jurisdiction.

The costs of all tests, repairing of all damage resulting from these tests, replacement of equipment and materials including labor and other necessary work, due to conformance with the Electrical Ordinances, Safety Orders, these specifications and accompanying drawings, shall be borne by the Contractor.

Should the Contractor refuse or neglect to make any tests necessary to satisfy the Engineer that the work has been performed in accordance with the true intent and meaning of the contract documents, the Agency may make such tests and charge the expense to the Contractor and retain the cost of testing from the final payment to the Contractor.

All wiring and connections shall be tested for continuity grounds and short circuits before the devices and equipment are connected. Upon completion of the work, the contractor shall demonstrate to the Engineer the satisfactory operation of the entire electrical system(s).

At the time of the final inspection, the Contractor shall have a qualified electrician at the job site to make all required tests or demonstrate operation of electrical equipment and lighting system(s).

307-21.10 Protection of Existing Site Improvements. Restore disturbed turf areas, irrigation systems, etc. Repair damaged park equipment and turf caused by the

Contractor to new condition, including backfill and sodding of trench surface to the Engineer's satisfaction.

307-21.11 Guarantee. The Contractor shall guarantee all work of this Contract to be free from defects in material and workmanship for a period of one (1) year from the date of acceptance of the work for filing of the Notice of Completion.

The Contractor shall repair or otherwise make good at its own expense all defects developed during the guarantee period. The Agency may notify the Contractor by the telephone or in writing, and all guarantee work shall be performed within 48 hours after receiving notice from the Agency.

The Contractor's general guarantee shall be on their letterhead, and shall include the foregoing provisions and emergency telephone numbers. Together with the required manufacturer's guarantees, the Contractor's guarantee shall be bound and furnished to the Engineer in at least three copies.

307-21.12 Turn-Over Items. Panel keys, spare parts, record drawings, maintenance manuals, guarantees; all items shall be delivered to the Engineer prior to authorization of final payment.

307-21.13 Payment. Payment for Electrical Work shall be considered included in those items of work and no separate payment will be made therefore; and shall be for complete operating electrical systems and connections, but not limited to, conduit, conductors, pull boxes, receptacles, trenching, boring, power supply connection, distribution; power supply feed, and other work appurtenant to the provisions of the electrical systems, as shown on the drawings.

SECTION 308 - LANDSCAPE AND IRRIGATION INSTALLATION

308-1 GENERAL

Irrigation and landscaping work shall be incorporated into various phases of roadway construction.

All existing lawn and landscape areas disturbed by the Contractor as part of or as a result of the work shall be prepared and resodded and/or replanted in kind, except as otherwise designated in the Plans. Existing irrigation systems shall be repaired and restored to operating condition to the satisfaction of the Engineer.

Contractor shall field verify with Engineer exact location of all irrigation components such as, but not limited to, valves, sprinkler heads, piping, etc., prior to start of construction. All irrigation components shall be protected in place. However, where there are conflicts with new sidewalks, the water supply lines, valves, and sprinkler heads shall be modified and adjusted to grade or relocated, as necessary. The reinstallation of irrigation components shall be performed in the same manner in which they were originally installed.

Contractor shall not have the existing irrigation system inoperable for more than 48 hours continuously.

308-2 EARTHWORK AND TOPSOIL PLACEMENT

308-2.3 Topsoil Preparation and Conditioning

308-2.3.1 General. Add the following:

After Class A and/or Class C topsoil has been placed and prior to amendment, the topsoil will be sampled and tested by the Contractor to assure compliance with the Specifications and approved testing source. Supplemental tests may be made to assure compliance with amendment and fertilization specifications. All costs associated with testing shall be borne by the Contractor.

308-2.3.2 Fertilizing and Conditioning Procedures. Add the following:

The topsoil shall be amended as recommended by the testing laboratory. Should the amendment recommendations furnished by the laboratory exceed those required by the bidding documents, the laboratory recommendations shall be applied at no additional cost to the Agency.

Incorporate into the top 6" of the soil, using a mechanical tiller, tilling in two separate directions the following materials, in all areas to be planted:

Material	Rate per 1,076 square feet
Type I Amendment	3 cubic yards
Commercial Fertilizer	10 pounds
Agricultural Gypsum	100 pounds

308-3 HEADER INSTALLATION

Add new Section 308-3.1 MOISTURE BARRIER AND ROOT CONTROL BARRIER INSTALLATION

308-3.1.1 Moisture Barrier Installation. Moisture barrier membrane shall be installed in all median islands, completely surrounding the areas to be irrigated and planted. Membrane shall extend a minimum of 30-inches below top of curb.

Attach membrane securely and continuously to the back of curb with a mastic adhesive.

Lengths of sheeting shall be joined by folded and cemented lap seams, completely waterproof. Furnish two samples of a completed seam to the Engineer for approval prior to start of this work. Seams shall be minimum 4-inches wide by width of sheet.

308-3.1.2 Root Control Barrier Installation. Install root control barrier in all tree wells to form a continuous barrier at the perimeter. Install and join sections in strict accordance with manufacturer's printed instructions.

308-4 PLANTING

308-4.1 General. Add the following:

The Contractor is responsible to schedule tree deliveries. Daily deliveries shall not exceed the Contractor's capability to place delivered trees on site unless the Contractor has provided adequate off-site storage space. All charges for extra handling shall be borne by the Contractor.

The Contractor shall provide off-loading and placing equipment of adequate capacity to safely handle the furnished trees.

308-4.3 Layout and Plant Location. Delete the first paragraph and replace with the following:

"The Contractor will layout all planting areas and stake locations of trees for the Engineer's approval prior to planting."

308-4.5 Tree and Shrub Planting. Delete the fourth paragraph of Subsection 308-4.5 of the Standard Specifications and replace it with the following:

All planting holes (except for palms) shall be backfilled with a prepared backfill mix consisting of the following:

<i>A. Material</i>	Rate per cubic yard
Topsoil	1.0 CY
Soil Amendment	0.25 CY
Iron Sulfate	2 lbs.
Commercial Fertilizer	1 lb.

Insert planting tablets in the manner and of the number specified by the manufacturer in its printed instructions.

308-4.10 Mulch.

308-4.10.1 Installation. Following acceptance of plant material installation, apply even layer of mulch, 2-inches thick, over all areas shown as planting areas on the Plans, except lawn areas. The mulch blanket inside watering basins shall be 2 inches thick. Taper thickness of mulch to meet pavement ½" minimum below the finished surface of pavement. Keep mulch 6 inches away from tree and shrub root crown.

308-5 IRRIGATION SYSTEM INSTALLATION

308-5.1 General.

- (a) Record Drawings. Show dimensioned location of all buried pipe and valves, and control pilot wires to valves and controllers. Take dimensions prior to backfilling trenches. All corrections on record drawings shall be done in red ink. Dimensions must be taken from above-ground, permanent, architectural objects. Do not dimension from plants or trees or sprinkler heads. Record drawings shall be reviewed prior to all progress payment approvals.
- (b) Charts. On the inside surface of the cover of the automatic controller, the Contractor shall prepare and mount a chart showing the valves and sprinkler heads serviced by that particular controller. All valves shall be numbered to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown. This chart shall be an entire sprinkler plot plan, including building, walks, roads, and walls. A photostatic print of this plan, reduced as necessary and legible in all details, shall be made to a size that will fit into the controller cover. This print shall be approved by the Engineer and shall be hermetically sealed in plastic. This shall then be secured to the inside of the cover in a manner approved by the Engineer.

308-5.1.2 Items to be Furnished by Contractor. Provide the following tools as a part of this contract:

- (a) Two sets of keys for automatic controller cabinet.
- (b) Two sets of keys for lock on controller enclosures.
- (c) One coupler for quick coupler valves; coupler shall be equipped with ¾" diameter 12" tall bronze hose bib, bent-nose type, with handwheel.

- (d) Two loose keys for quick coupler valves installed under this contract.
- (e) Two special wrenches suitable for operating each type of shut-off valve installed under this contract.
- (f) Two tools for disassembly and assembly or adjustment of each type equipment used in this installation requiring such special tools.
- (g) One valve box key for lock-lid valve boxes used in this installation.
- (h) Two sets of operating instructions and a parts list as printed by each manufacturer of each type equipment included in this contract; refer to "Materials" section of the Specifications and legend on drawings.
- (i) One specified padlock for each controller enclosure, as approved by the City.

308-5.1.3 Guarantees. A letter guarantee from each manufacturer shall be submitted to the Agency guaranteeing materials for a period of 1 year against material defects and workmanship. In cases where longer guarantees are required by these Specifications, such guarantees are separate and distinct from the Contractor's general guarantee.

308-5.2 Irrigation Pipeline Installation.

308-5.2.5 Trench Backfill in Roadways and Parking Areas. Section 308-5.2.5 is hereby added to Section 308 of the Standard Specifications as follows:

1. All trenches for pipeline and electrical conduit under roadways shall be backfilled with a portland cement concrete treated slurry conforming to Subsection 201-1.1.2. Class Use Table for Trench Backfill Slurry. Sand bedding material shall extend at least 6 inches above the pipe or conduit.
2. Paving for trench cover shall meet the pavement requirements for this project and shall be at least the thickness of adjacent undisturbed paving plus 1-inch, thoroughly compacted in place, and finished to a neat continuous surface.

308-5.3 Installation of Valves, Valve Boxes, and Special Equipment. Add the following:

Pull boxes for control wires that are set in pavement shall be flush with the finish surface.

Pull boxes for control wires, valve boxes, etc., shall be offset from and parallel to walk.

308-5.5 Automatic Control System Installation

The Automatic Irrigation Controller Assembly shall include the following:

- Automatic Irrigation Controller, 6 station
- Master valve module and relay

Automatic Irrigation Controller Assemblies shall include supplemental irrigation control systems.

Supplemental irrigation control systems equipment shall include furnishing and installing the specified equipment in conformance with the manufacturer's written instructions and specifications, including communications equipment, sensors, wire, valve boxes, special connectors, terminal boards, and any other equipment required to provide a complete operating system.

308-5.6 Flushing and Testing.

308-5.6.1 General. The text of Subsection 308-5.6.1 of the Standard Specifications is hereby deleted and replaced with the following:

Flush Main Lines. Flushing of the lines will be done before quick coupling valves and remote control valves are in place. All open ends shall be piped (temporarily) to exhaust flushing water up and out of the trenches. No water will be permitted to fall into the trench. Flushing procedure will be to first open the ports nearest the source, then recap and move progressively toward the end of the line with only one open port flushing at any one time.

308-5.6.2 Pipeline Pressure Tests. The text of Subsection 308-5.6.2 of the Standard Specifications is hereby deleted and replaced with the following:

1. Main Lines: Pressure tests on main lines shall be made after lines have been flushed and after control valves and quick coupling valves are set in place. Close all control valves by hand. Pipes shall be centerloaded leaving all fittings exposed. Contractor shall furnish force pump and pressure gauges necessary to complete pressure tests.
2. Pipe: All metal main lines in the system shall be capped and pressure tested at 125 psi for a period of 1 hour with no drop in pressure. All leaks found shall be corrected by turning the pipe in the fittings as no caulking or epoxy fillers will be permitted.

3. Plastic Pipe: All plastic main lines in the system shall be capped and pressure tested at 125 psi for a period of 1 hour with no drop in pressure. All leaks found shall be corrected by removing the leaking pipe or fittings and installing new material in place thereof and retesting.
4. Closing in Uninspected Work: The Contractor shall not allow nor cause any of this work to be covered or enclosed until it has been inspected, tested and approved by the Engineer. Should any of this work be enclosed or covered before such inspection and test, the Contractor shall uncover the work at his own expense and after it has been inspected, tested and approved, shall make all repairs with like materials necessary to restore all his work and that of the other contractors to its original condition.

308-5.6.5 Approval. Subsection 308-5.6.5 is hereby added to Section 308 of the Standard Specifications as follows:

Written approval and acceptance of the irrigation system must be obtained before final payment is considered.

308-6 MAINTENANCE AND PLANT ESTABLISHMENT

308-6.1 General.

The entire project shall be satisfactorily maintained, commencing from the time that all items of work have been completed as specified in the foregoing articles of these Special Provisions and to the satisfaction of the Engineer, and continuing through the plant establishment period and the landscape maintenance period until final acceptance of the project.

Project maintenance work shall consist of:

Description of work items:	
Applying irrigation water to tree wells	Sweeping pavement
Removing weeds	Removing litter and debris
Caring for plants	Preventing and repairing damage
Repairing landscape systems	

Project maintenance work shall consist of applying water (except initial watering of plants), weeding, caring for plants, edging, sweeping walks, litter pickup, and performing all general project maintenance.

308-6.3 Landscape Maintenance Period.

The landscape maintenance period shall be a minimum of 90 calendar days, commencing upon written authorization from the Engineer. This period shall not start until all construction work is complete, including the plant establishment period.

308-6.4 Plant Establishment and Landscape Maintenance Requirements.

308-6.4.1 General. In order to carry out the work, the Contractor shall maintain a sufficient number of men and adequate equipment to perform the work herein specified from the time any planting is done until the final approval.

If at any time the Contractor is not performing maintenance work in the opinion of the Engineer, maintenance period shall be suspended and not restarted until all deficiencies have been corrected to the satisfaction of the Engineer. No payments will be made for work required during the suspended period and the period shall be extended by the length of time of the suspension.

All plants and planted areas shall be kept well watered and kept well weed-free at all times. Weeds shall be removed and disposed of off the site.

(Refer to Section 308-4.5.1 (d) for palm tree maintenance.)

The Contractor shall be responsible for detecting diseases and pests as soon as their presence is manifested. He shall take immediate action to identify the disease and/or pest and apply such remedies as are necessary to control the infestation. He shall remove all rodents, taking control measures immediately upon discovery.

Apply commercial fertilizer on all planted areas as required to sustain growth. The Engineer shall be notified at least 2 days before starting this operation.

Damage to planting areas shall be repaired immediately.

308-6.4.3 Trees, Shrubs, and Ground Covers.

No pruning shall be performed by the Contractor unless directed in writing by the Engineer. The Agency's Certified Arborist must be present for any attempted pruning operations. Seventy-two (72) hours prior notice to the Agency is required before commencing pruning operations.

ANY TREES PRUNED WITHOUT PERMISSION OR IN A FASHION UNACCEPTABLE TO THE AGENCY SHALL BE REPLACED IN KIND AND SIZE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE AGENCY.

If pruning is permitted by the Engineer:

- All trees and shrubs shall be pruned to maintain natural structure. Clipping into formal shapes such as boxes and balls will not be allowed unless such is specified in the design.
- Young trees shall be pruned to select and develop permanent scaffold branches; to remove overlapping and rubbing limbs; to eliminate narrow crotches; and to maintain growth within space limitations. All cuts shall be made to lateral branches, or buds, or flush with branch bark collar. Side pruning of young trees, stubbing or heading back will not be permitted.
- Evergreen trees shall not be pruned, except under the direction of the Engineer.
- The objectives of shrub pruning are the same as for trees.

Ground covers shall be edged and trimmed to keep in bounds and to achieve an overall even appearance. Keep ground cover 12-inches (300mm) clear of the base of shrubs, and clear of low branches.

308-6.4.4 Replacement of plants. All plants that show signs of failure to grow at any time during the life of the contract or those plants so injured or damaged from any cause, including vandalism, as to render them unsuitable for the purpose intended shall be immediately replaced in kind and size at the expense of the Contractor.

308-6.4.5 Inspections. A written notice requesting an inspection should be submitted to the Engineer at least 48 hours prior to the anticipated date.

Prior to inspection, the site must be thoroughly cleaned up and all excess material and debris removed.

Prior to start of and at the end of the plant establishment and landscape maintenance periods, the Contractor will be required to have a complete inspection and approval of all landscape construction items.

An inspection shall be scheduled at 30-calendar day intervals during the landscape maintenance period.

308-7 GUARANTEE

- (a) Close Out. The irrigation system shall be ready for complete automatic operation to the satisfaction of the Engineer. Contractor shall provide all appurtenances, devices, record documents, and manufacturers literature necessary to operate and maintain the system, and guarantees, in writing.

308-8 PAYMENT Add the following:

Payment for Landscape Planting and Irrigation System shall be as follows:

- (a) Soil Preparation: Payment shall be at the contract bid unit price per square foot, and shall include all costs of furnishing and installing fertilizers and conditioners, tilling, soil testing, fine grading, and other work required to prepare soils for planting.
- (b) Moisture Barrier: Payment shall be at the contract bid unit price per linear foot in place, and shall include all costs for furnishing and installing moisture barrier.
- (c) Sump Drain Assembly: Payment shall be at the contract bid price per each and shall include all costs for excavation and removals, drain rock, geotextile fabric, catch basin assemblies, and appurtenant work, and no additional payment will be made therefore.
- (d) Root Control Barrier: Payment shall be at the contract bid unit price per linear foot in place, and shall include all costs for furnishing and installing root control barrier.
- (e) Metal Tree Grate and Tree Well Planting: Payment shall be at the contract bid unit price per each for removal and replacing existing concrete sidewalk, furnishing and installing tree well grate and frame assembly and shall include all costs for furnishing and installing tree, soil backfill, gravel sump with pipe and grate, and soil excavation and disposal.
- (f) Trees and Shrubs: Payment shall be at the appropriate contract unit bid price per each size of container, and shall include all costs for furnishing and installing trees and shrubs.
- (g) Mulch. Payment shall be at the contract bid unit price per cubic yard installed, and shall be full compensation for furnishing and installing mulch.
- (h) Irrigation Main Line: Payment for irrigation main line shall be at the contract bid unit price per linear foot in place for each size specified in the bid.
- (i) Control Wire Conduit. Payment for control wire conduit shall be at the contract bid unit price per linear foot in place of each size as shown on the bid form, and

shall include all costs for furnishing and installing control wire conduit by trenching.

- (j) Shutoff Valve Assembly: Payment for shutoff valves shall be at the contract bid unit price per each valve of the size specified in the bid, and shall be for a complete operating assembly, including valve box.
- (k) Remote Control Valve Assembly: Payment for Remote Control Valve shall be at the contract bid unit price per each valve of the size specified in the bid, and shall be for a complete operating assembly, including valve box and cover and furnishing and installing control wires to controller.
- (l) Automatic Irrigation Controller Assembly: Payment for Automatic Irrigation Controller shall be at the contract bid lump-sum price, and shall include all costs for furnishing and installing a complete operating system, including conduit and enclosure, as required.
- (m) Control Wire: Payment for control wire shall be included in the contract bid unit price for Remote Control Valve Assembly.
- (n) Bored Pipe Sleeving: Payment shall be at the contract bid unit price per linear foot in place for each size specified in the bid form and shall include all costs for furnishing and installing pipe sleeving by boring, including pavement removals and replacement, excavation for set-up pits, potholing, and all other costs necessary for boring.
- (o) Wye Strainer-Pressure Regulator Assembly: Payment for the wye strainer-pressure regulator assembly shall be at the contract bid unit price for each, and shall be a complete operating assembly, including valve box.
- (p) Quick Coupling Valve Assembly: Payment for quick coupling valves shall be at the contract bid unit price per each, and shall be for a complete operating assembly, including valve box.
- (q) Irrigation Head Assembly: Payment for irrigation heads shall be at the contract bid unit price per each for each type of head specified, and shall include serving lateral piping between heads and from control valve, and all other appurtenant devices and work.
- (r) Rain Bird RWS: Payment for RWS shall be at the contract bid unit price per each as specified and shall include serving lateral piping between each unit and from control valve, and all other appurtenant devices and work.
- (s) Existing Medians Landscaping Repair and Irrigation System Modification: Payment for Medians Landscaping Repair and irrigation system modifications shall be at the contract bid lump-sum price, and shall include all costs for furnishing and installing a complete operating system as specified on the drawings, including

lowering and/or raising and relocating existing valve boxes and valves, water supply and lateral lines and sprinkler heads; adjusting control wire servicing the valve; adjusting control wires to controller, lateral pipes, and splice boxes; sleeving, cutting and capping existing water supply and lateral lines to accommodate the new alignment; salvage irrigation controller; removing and/or abandoning irrigation equipment, conduit, boring under curbs and sidewalk, trenching for sleeving, and trenching for lateral pipe; backfilling, AC and PCC pavement replacement, replacement of damaged plant material in kind, and all appurtenant devices and work, and no additional compensation will be made therefore.

This bid item shall include all costs for furnishing and installing replacement plant material and hardscape paving due to temporary removal of roadway medians as specified on plan, temporary relocation, maintenance and re-planting of existing Queen Palm on Slauson Avenue median shall be at the contract bid price per each and shall include all costs for removing, boxing, maintaining, re-planting and all appurtenant devices and work, and no additional compensation will be made therefore.

- (t) Landscape Maintenance Period: Payment shall be at the contract lump-sum bid price, and shall include all costs of labor, materials, equipment, tools, and appurtenances to maintain the landscape planting, tree well planting and watering, manual watering of trees, and irrigation system.

ADJUST STORM DRAIN MANHOLE RINGS AND COVERS, SEWER MANHOLE COVERS, GAS AND WATER VALVE COVERS TO GRADE

Adjustment of storm drain/sewer manhole covers to grade shall be in accordance with Section 403-3 of the Standard Specifications and the agency or utility that owns or has control of the manhole.

For all new manhole rings and covers furnished by the Contractor, certification shall include the test results from test Method B as called for in Subsection 206-3 "Gray Iron Castings," of the Standard Specifications.

Raised manhole rings and covers shall have a Type II barricade with two a flashing light placed over each manhole until it is paved.

After the pavement has been completed, the necessary portions of the subgrade, base, and pavement shall be neatly removed, the structure built-up, and the manhole frame set to be backfilled with PCC concrete and Type III-C3-PG64-10 asphalt concrete. The asphalt concrete shall be placed and compacted in a workmanlike manner to conform to the appearance of the surrounding pavement. The asphalt concrete shall be placed within two (2) days after the manhole ring and cover has been adjusted to final grade, unless otherwise approved by the Engineer. The Contractor shall so schedule this work that adjusted manholes and rings shall not remain unpaved over holidays and weekends.

All new and existing water valve covers shall be adjusted to grade during paving. The Contractor shall furnish all slip sleeves or cans where none exist. The Contractor shall loosen all valve covers immediately after paving. The Contractor shall paint all water valve covers blue.

The contract unit price paid per each for adjusting water valve covers, storm drain manhole covers, and sewer manhole covers to finished grade shall include full compensation for furnishing all labor, materials, tools, and equipment, and for doing all the work involved in adjusting gas, water valve covers, storm drain manholes, and sewer manholes to finished grade, complete in place, and no additional compensation will be allowed therefor.

All costs for testing, record drawings, and other miscellaneous costs shall be distributed among the various items, and no additional payment will be made therefor.

---END OF PART 3 SECTION---

TECHNICAL SPECIFICATIONS

SIGNALS, LIGHTING, AND ELECTRICAL SYSTEMS

All equipment, materials, and components for traffic signal loop replacement shall conform to the Caltrans Standard Plans, latest edition and Standard Specifications, Section 86, "Signals, Lighting, and Electrical Systems," latest edition except as noted in the Special Provisions and on the Plans. These Plans and Specifications are hereinafter referred to as State Standard Plans and State Standard Specifications. Copies of these documents are available from the Caltrans, District 7 office at 100 South Main Street, Los Angeles, California 90012 or from Caltrans, 6002 Folsom Boulevard, Sacramento, California 95819, (916) 445-3520.

15-2 MISCELLANEOUS HIGHWAY FACILITIES

15-2.02 Removal Methods.

All existing traffic signal and street lighting equipment and pole designed for removal shall be salvaged and delivered to city yard. If directed by the City Engineer otherwise, contractor shall remove and dispose of the un-wanted equipment and poles.

Existing City-owned street lighting system shall not be removed until the new system is functional.

Existing overhead sign structure shall be removed and salvaged complete. Foundation shall be removed and disposed of. Contractor shall deliver salvaged overhead sign structure to City Maintenance Yard. Coordinate location and delivery with City Inspector.

15-2.07 Payment. Payment for the removal of existing City-owned street lights, pull boxes, footings, appurtenances, delivery, disposal, foundation and recompaction at footings shall be included in the lump-sum price bid for Street Lighting System, and no additional compensation will be allowed therefor.

Payment for the removal of existing Overhead Sign Structure including sign panel, frame, delivery, disposal, foundation and recompaction at footing shall be included in the lump-sum price bid for removal of overhead sign structure, and no additional compensation will be allowed therefor.

86-1 GENERAL

86-1.03 Cost Breakdown. The cost breakdown shall be submitted to the Engineer in conjunction with equipment list and drawings.

86-1.04 Equipment List and Drawings. The equipment list shall be submitted to the Engineer within ten (10) working days after the date of the Notice of Contract Approval. Notice to procure equipment and material will be issued upon the approval of submittals.

Materials lists, manufacturer's data, brochures, technical data, etc., shall be labeled and identified, and shall be submitted in bound booklet form.

The Contractor shall retain one copy of all approved material lists and samples at the job site, readily accessible for inspection by the Engineer. Said materials lists and samples shall be the basis for approval or rejection of work.

86-1.05 Warranties, Guarantees, and Instruction Sheets. The Contractor shall guarantee the entire work constructed under this contract and will fully meet all requirements as to quality of workmanship and materials furnished by him. The Contractor shall make, at the Contractor's expense, any repairs or replacements made necessary by defects in workmanship or materials that becomes evident within 1 year after acceptance of work by the Agency and to restore to full compliance with the requirements of these Specifications, any part of the work which during the 1-year period is found to be deficient with respect to any provision of the Plans and Specifications. The Contractor shall make all repairs and replacements promptly upon receipt of written orders from the Engineer. If the Contractor fails to make the repairs and replacements promptly, the City may do the work and the Contractor and his surety shall be liable to the City for the cost.

Whenever any work or equipment is to be guaranteed or maintained by a manufacturer, supplier, or subcontractor, said obligation shall be that of the Contractor.

All guarantees shall be in writing and delivered to the Engineer by the Contractor prior to final acceptance of the work.

86-1.06 Maintaining Existing and Temporary Electrical Systems. All work and materials required to keep the existing traffic signal and street lighting systems operational, including temporary traffic signal poles and wiring will be considered as included in the lump-sum price bid for traffic signal modification, and no additional compensation will be allowed therefor.

New traffic signal system shall be in operation before the removal of existing traffic signal.

Traffic signal shutdowns shall be limited to the hours between 9 a.m. and 3 p.m. and shall not be permitted on Friday, Saturday, or Sundays.

Where the Contractor-installed facilities are damaged prior to final acceptance by the Engineer, the Contractor shall repair or replace such facilities at his own expense.

86-1.07 Scheduling of Work.

Traffic signal work shall be incorporated into various phases of roadway construction. The Contractor shall maintain the traffic signal in operational at all times.

PCC flat work around poles and pull boxes shall coordinated with signal work. Box out or separate PCC placement due to the scheduling shall be made at no additional cost to the City.

The job site shall be maintained in a neat and orderly condition at all times and areas of sidewalk removal to be left open for less than 5 days shall be covered with plywood sheeting and barricades. Areas to be left open more than 5 days shall be patched with temporary AC pavement, smoothed to provide a level finished walking surface.

All striping, pavement markings, and signing shall be in place prior to signal turn on.

Turn on of the traffic signal system shall not be made on a Friday or the day preceding a legal holiday, and will be permitted between the hours of 9 a.m. and 2 p.m. only. The City shall be notified at least 48 hours prior to the intended turn on and the City's signal maintenance company must be present.

86-2 MATERIALS AND INSTALLATION

86-2.01 Excavation and Backfilling. Excavation for foundation shall be hand dug until clear of obstructions.

The last paragraph of Subsection 86-2.03 is hereby deleted and replaced with the following:

Existing footings for street lights and traffic signals shall be removed and the remaining hole backfilled and compacted.

86-2.04 Standards, Steel Pedestals, and Posts. Where the State Standard Plans refer to the side tenon detail at the end of the signal mast arm, the applicable tip tenon detail may be substituted.

86-2.05 Conduit. Conduit shall be rigid steel with metallic fittings for traffic signals and street lighting. Conduit installation shall be coordinated with the phased street improvement work at no additional cost to the city.

86-2.06 Pull Boxes. Pull boxes shall be pre-cast reinforced concrete. Grout-in bottom of pull boxes will not be required.

Electrical pull boxes, unless noted otherwise on the Plans, shall be No. 5 or larger and shall have plastic lined lids.

No pull box shall be located in or within 1-foot of any curb ramp.

86-2.08 Conductors.

86-2.08B Multiple Circuit Conductors. Multiple circuit conductors shall be THW type.

86-2.09 Wiring.

86-2.09D Splicing. Splices shall be Type C insulated by Method B, as shown on State Standard Plan ES-13A, except detector conductor (video, loop, et cetera) splices shall be Type S or T insulated by Method B, as shown on Standard Plan ES-13A, and shall also be soldered.

86-2.14 Testing. Materials and equipment furnished by the Contractor shall be tested at an independent testing facility designated by the City.

Cost for testing and delivery to and from the test site shall be considered as included in the lump-sum price bid for traffic signal modification, and no additional compensation will be allowed.

86-3 CONTROLLER ASSEMBLIES

Type 170E controller in a Type 332 cabinet per Section 86-3.03, "Model 170 and Model 2070 Controller Assemblies" of the State Standard Specifications. Controllers and cabinets shall be modified as shown on the Plans with all necessary equipment for the intended operation.

Install a Traffic Uninterruptible Power Supply (UPS) in a separate free-standing Myers cabinet and in accordance with the following Specification:

11.0 WARRANTY

The Contractor shall arrange to have a representative of the Engineer and a signal technician present at the time of the new controller operation is implemented. The technician shall be fully qualified to work on the controller assemblies, and shall be employed by the controller manufacturer or his authorized representative. The Engineer's representative shall be notified at least 48 hours prior to the turn on.

86-4 TRAFFIC SIGNAL FACES AND FITTINGS

Vehicle signal heads shall be in accordance with Sections 86-4.01, "Vehicle Signal Faces," 86-4.02 "Light Emitting Diode Signal Module" and 86-4.04, "Backplates," of the State Standard Specifications, except as modified or supplemented herein.

All replaced vehicular indications shall have 12-inch lenses, open-at-bottom circle visors, and louvered backplates per City Specifications.

Traffic signal faces, all traffic signal sections, shall utilize light emitting diode signal modules. Each light emitting diode (LED) signal module shall consist of an assembly that utilizes light emitting diodes as the light source in lieu of an incandescent lamp for use in traffic signal sections.

The LED module shall be Type 1 per Caltrans specifications. Please visit the following website for details of the Caltrans LED specifications:

http://www.dot.ca.gov/hg/esc/ttsb/electrical/electrical_index.htm

Plastic signal sections, lenses, visors and backplates shall not be used.

Pedestrian signal heads shall be in accordance with Sections 86-4.06, "Pedestrian Signal Faces," and 86-4.07 "Light Emitting Diode Pedestrian Signal Face 'Upraised hand' module" of the State Standard Specifications, except as modified or supplemented herein.

All pedestrian signal heads shall be modular with international symbols and conform to the following specifications:

- A. Dimensions. The maximum overall dimension of the signal shall be 18-1/2 inches wide, 18-3/4 inches high and nine inches deep, including Z-crate type visor and hinges.
- B. Pedestrian Signal Face: All new pedestrian signal faces shall be Type "A".
- C. Z-Crate Visor: Each signal shall be provided with a Z-crate type visor designated to eliminate sun phantom. Under strong ambient light conditions, the message shall "blank out" when the signal is not energized.
- D. Housing: The housing case shall be a one-piece corrosion resistant aluminum alloy die casting complete with integrally cast top, bottom, sides and back. Four integrally cast hinge lug pairs shall be provided for operation of a swing-open door.
- E. Maintenance Features: The case and door frame when properly mated to other pedestrian signal components and mounting hardware shall provide a dust-proof

and weatherproof enclosure, and shall provide for easy access to and replacement of all components. In order to facilitate installation and maintenance, the signal shall be designed so that all components are readily accessible from the front by merely opening the signal door.

- F. Door Frame: The door frame shall be one-piece corrosion-resistant aluminum alloy die casting, complete with two hinge lugs and two latch slots cast for each door. The door shall be attached to the case by means of two Type 304 stainless steel spring pins. Two stainless steel hinge bolts with captive stainless steel wing nuts and washers shall be attached to the case with the use of stainless steel spring pins. Hence, latching or unlatching of the door shall require no tools.
- G. Countdown Pedestrian Signal Module (Combination Raised Hand and Walking Person with Two Digit Countdown Timer) shall be of the LED type. Countdown pedestrian signal LED module shall comply with current LED pedestrian signal modules specifications from the Institute of Transportation Engineers and Caltrans with the following provisions:
1. All modules shall have a visual appearance similar to an incandescent lamp. They shall have a smooth, uniform, non-pixelated appearance. Hand and Person icons are to appear solid. No outline icons are allowed.
 2. The module shall display the correct countdown display subsequent to the Walking/Person during a Flashing Red/Hand without an intervening display of Solid Red/Hand.
 3. LED timer shall count down the duration of the “flashing Raised Hand” phase. Timer shall start at the beginning of the “Flashing raised Hand” signal phase and blank out after the end of the “Flashing Raised Hand” signal phase.
 4. The countdown display shall be two digits, and the numbers 00 to 99 on the numerical display shall have a minimum height of 180 mm (7 inches) and shall be Portland Orange in color.
 5. When Solid Fill Pedestrian Signal Face is displayed, both the raised hand and the walking man indications shall be formed with an array of LEDs such that the indications provides a filled-in/solid appearance.

86-5 DETECTORS

86-5.01 Vehicle Detectors. Vehicle detectors shall be of the inductive loop, Type E. Leading loops adjacent to crosswalk or limit line in each lane shall be Type D, as shown on the plans.

Loop detector wire shall be Type 2.

Loop detector lead-in cable shall be Type B.

Contractor to core drill a round traffic signal loop using a 6' diameter core bit with diamond impregnated segments. The slots shall be vertical and 0.5 inches wide by 5.0 inches in depth with 3.0 inches of cover from loop wire to pavement surface. No other holes or means of anchoring a router or flat saw to perform the cut will be accepted.

Sawcut to the appropriate pull box within 50 feet. Sawcut to be .250 inches to width x 5.0 inches in depth.

Detector loop locations shall be approved by Engineer in the field prior to installation.

PVC conduit per Standard Plan ES-5E, Curb Termination Detail, Type B, shall be installed wherever a loop-wire saw cut crosses an expansion joint or pavement type change.

The sides of the loop saw cut slots shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 1½-inches. Slot width shall be a maximum of ¾-inch. Slots of circular loops shall be filled with elastometric sealant.

Loops shall be installed on the same day in which the loop slots are cut. This shall include placement of the loop conductors and sealant.

86-5.02 Pedestrian Push Buttons. Pedestrian push buttons shall be Polara Model BDLM2-G with standard Option A plate marking assembly.

Pedestrian push button signs shall conform to the details shown on the plans, except that the message and symbols shall conform to the California Sign Specification Sheet No. R62D.

86-6 LIGHTING

All equipment, materials, and components for the installation of the street lighting conduit system shall conform to the project plans, specifications and requirements of the City of Culver City.

Street light pole shall be Ameron Model #1-C3-28-J-8, Drawing No. 47102B.

Induction fixtures for street lighting and safety lighting shall be US Lighting Tech, HA-120/240V-250W-4K-01.

All conduit, except crossing shall be behind curb in parkway, when practical.

86-6.065 Internally Illuminated Street Name Signs. New street name signs shall be non-illuminated regulatory signs.

The second paragraph of "Housing," of the fifth paragraph of Section 86-6.065, "Internally Illuminated Street Names" of the Standard Specifications is deleted.

Details of color, style, borders, City logo, and spacing shall conform to the standards established by the City. "Periods" shall not be used on abbreviations. A scale layout for each legend shall be submitted to the Engineer for approval prior to fabrication.

86-6.07 Photoelectric Controls. Photoelectric control shall be Type IV for all intersection lighting.

86-8 PAYMENT

86-8.01 Payment. The second paragraph of Section 86-8.01, "Payment," of the State Standard Specifications, is superseded by the following:

Payment for traffic signal improvements shall be included in the lump-sum price bid for each traffic signal modification (including all loops) and appurtenant equipment as shown on the Plans, and shall include coordination with the phased street improvement work and no additional compensation will be allowed therefor.

Payment for street lighting improvements shall be included in the lump-sum price bid for each street lighting as shown on the Plans, and no additional compensation will be allowed therefor.

---END OF SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS SECTION---

TECHNICAL SPECIFICATIONS

SIGNING, STRIPING, AND PAVEMENT MARKERS

All equipment, materials, and components for signing and striping, and the installation thereof, shall conform to the Caltrans Standard Plans, latest edition and Standard Specifications, Section 56, "Signs," Section 84, "Traffic Stripes and Pavement Markings," and Section 85, "Pavement Markers," latest edition except as noted in the Special Provisions and on the Plans. These Plans and Specifications are hereinafter referred to as State Standard Plans and State Standard Specifications. Copies of these documents are available from Caltrans, District 7 office at 100 South Main Street, Los Angeles, California 90012 or from Caltrans, 6002 Folsom Boulevard, Sacramento, California 95819, (916) 445-3520. Within the City of Los Angeles jurisdiction, all equipment, materials, and components for signing and striping and installation thereof shall conform to the Los Angeles Department of Transportation (LADOT) Application and Design for Striping, Channelization and Special Signing.

All materials required for the completion of work as shown on the Plans shall be provided by the Contractor.

SECTION 56 - SIGNS

56-2 ROADSIDE SIGNS

56-2.03 Construction. Relocated signs shall be installed using existing posts at new locations and shall be set at a minimum 30-inch depth and at a minimum 12-inch square portland cement concrete (PCC). The post depth of the concrete footing shall be sufficient to extend at least 6-inches below the bottom of the posts. ¼-inch expansion paper shall be placed between the sign foundation and sidewalk.

New signs shall be installed using metal posts set at a minimum of 30-inch depth in a minimum 12-inch square PCC, except as specified otherwise, the metal post shall be Schedule 40, galvanized steel pipe with a 2¾-inch outside diameter and a 2½-inch inside diameter. The length of the metal post shall be sufficient to extend from the top of the sign to 30-inches below the top of the concrete footing and provide a 7-foot clearance between the finished grade and the bottom of the sign. The depth of the concrete footings shall be sufficient to extend at least 6-inches below the bottom of the posts. ¼-inch expansion paper shall be placed between the sign foundation and sidewalk.

Marker and delineators shall conform to the provision in Section 82, "Markers and Delineators."

56-2.06 Payment. Payment for signing shall be included in the bid price for signing and striping, and no additional compensation will be allowed therefor.

SECTION 84 - TRAFFIC STRIPES AND PAVEMENT MARKINGS

84-1 GENERAL

84-1.01 Description. Traffic stripes and pavement markings, shall be THERMOPLASTIC unless otherwise shown on the Plans. Curb markings shall be paint. Contractor shall repaint all curb markings within the project limits at the completion of the construction unless otherwise directed by the Engineer.

84-1.02 Control of Alignment and Layout. The Contractor shall furnish the necessary control points for all striping and markings, and shall be responsible for the completeness and accuracy thereof to the satisfaction of the Engineer.

The Contractor shall establish all traffic striping between these points by stringline or other method to provide striping that will vary less than ½-inch in 50-feet from the specified alignment.

When no previously applied figures, markings, or traffic striping are available to serve as a guide, suitable layouts shall be spotted in advance of the permanent paint application. Traffic lines may be spotted by using a rope as a guide for marking spots every 5-feet, by using a marking wheel mounted on a vehicle, or by any other means satisfactory to the Engineer.

The Contractor shall mark or otherwise delineate the traffic lanes in the new roadway or portion of roadway, or detour before opening it to traffic.

The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimensions, and application of the paint.

Spotting shall be completed prior to the removal of any existing stripes. Existing stripes and markings shall be removed prior to painting new stripes and markings, but in no case shall any section of street be left without the proper striping for more than 24 hours, or over weekends or holidays.

Existing traffic stripes (including raised pavement markers), pavement legends, and markings that do not conform to the plans shall be removed by wet sandblasting per Section 15-2.02B, "Traffic Striping and Pavement Markings," and Section 15-2.02C, "Pavement Markers," of the State Standard Specifications.

84-2 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS

84-2.02 Materials. Traffic striping shall be thermoplastic including crosswalks, arrows and other pavement legends. Contractor shall apply approved primer/sealer on PCC street surface prior to install the thermoplastic striping and markings.

84-2.05 The installation of traffic stripes includes placement of raised pavement markers when called for on the plans.

Adhesive for raised pavement markers shall be per Section 85, "Pavement Markers." Epoxy shall be the Rapid Set type.

84-2.07 Payment. Payment for striping details, pavement markings, and curb marking shall be included in the price bid for signing and striping, and no additional compensation will be allowed.

84-3 PAINTED TRAFFIC STRIPES AND PAVEMENT MARKINGS

84-3.02 Materials. Paint for curb markings shall be ready-mixed rapid dry type. Ready-mixed paints shall be suitable for use on either asphalt concrete or portland cement concrete.

84-3.05 Application. Paint shall be applied in two coats. The second coat of paint shall be applied no less than 24 hours from application of the first coat.

Each coat of paint shall include glass beads.

84-3.07 Payment. Payment for curb markings shall be included in the price bid for signing and striping, and no additional compensation will be allowed.

SECTION 85 – PAVEMENT MARKERS

85-1.06 Placement. Adhesive for raised pavement markers shall be rapid set type epoxy.

Removal of pavement markers shall be per Section 15-2.02C, "Pavement Markers."

85-1.09 Payment. Payment for pavement markers shall be included in the lump-sum price bid for signing and striping, legend and pavement markings and no additional compensation will be allowed therefor.

---END SIGNING, STRIPING AND PAVEMENT MARKERS SECTION---

SPECIAL PROVISIONS

(STRUCTURAL)

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)	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	50–120
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 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.

^aIf 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)	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	32–60
Before final cleaning and immediately before placing concrete (sec/qt)		≤ 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.

^aIf 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	$\leq 64.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
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.

^aIf 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	$\leq 67.0^a$
Before final cleaning and immediately before placing concrete (pcf)		$\leq 64.0^a$
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.

^aIf 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.

^aIf 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.

^aIf 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.

50 PRESTRESSING CONCRETE

**Required Contract Language for Federal-Aid Project
(Version: July 2016)**

EXHIBIT 12-G REQUIRED FEDERAL-AID CONTRACT LANGUAGE
(For Local Assistance Construction Projects)

The following language must be incorporated into all Local Assistance Federal-aid construction contracts. The following language, with minor edits, was taken from the Code of Federal Regulations.

1. DISADVANTAGED BUSINESS ENTERPRISES

DBE).....ERROR! BOOKMARK NOT DEFINED.

A. DBE COMMITMENT

SUBMITTAL.....ERROR! BOOKMARK NOT DEFINED.

B. GOOD FAITH EFFORTS

SUBMITTAL.....ERROR! BOOKMARK NOT DEFINED.

C. EXHIBIT 15-G - CONSTRUCTION CONTRACT DBE

COMMITMENT.....ERROR! BOOKMARK NOT DEFINED.

D. SUBCONTRACTOR AND DISADVANTAGED BUSINESS ENTERPRISE

RECORDS.....ERROR! BOOKMARK NOT DEFINED.

E. PERFORMANCE OF DISADVANTAGED BUSINESS

ENTERPRISES.....ERROR! BOOKMARK NOT DEFINED.

2. BID

**OPENING.....ERROR!
BOOKMARK NOT DEFINED.**

3. BID

**RIGGING.....ERROR!
BOOKMARK NOT DEFINED.**

<u>4. CONTRACT</u>	
<u>AWARD.....</u>	<u>ERROR! BOOKMARK</u>
<u>NOT DEFINED.</u>	
<u>5. CONTRACTOR</u>	
<u>LICENSE.....</u>	<u>ERROR! BOOKMARK NOT</u>
<u>DEFINED.</u>	
<u>6. CHANGED</u>	
<u>CONDITIONS.....</u>	<u>ERROR! BOOKMARK</u>
<u>NOT DEFINED.</u>	
<u>A. DIFFERING SITE</u>	
<u>CONDITION.....</u>	<u>ERROR! BOOKMARK</u>
<u>NOT DEFINED.</u>	
<u>B. SUSPENSIONS OF WORK ORDERED BY THE</u>	
<u>ENGINEER.....</u>	<u>ERROR! BOOKMARK NOT DEFINED.</u>
<u>C. SIGNIFICANT CHANGES IN THE CHARACTER OF</u>	
<u>WORK.....</u>	<u>ERROR! BOOKMARK NOT DEFINED.</u>
<u>7. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED</u>	
<u>DAMAGES.....</u>	<u>ERROR! BOOKMARK NOT DEFINED.</u>
<u>8. BUY</u>	
<u>AMERICA.....</u>	<u>ERROR!</u>
<u>BOOKMARK NOT DEFINED.</u>	
<u>FURNISH STEEL AND IRON MATERIALS TO BE INCORPORATED INTO THE WORK WITH CERTIFICATES OF</u>	
<u>COMPLIANCE. STEEL AND IRON MATERIALS MUST BE PRODUCED IN THE U.S.</u>	
<u>EXCEPT.....</u>	<u>ERROR! BOOKMARK NOT DEFINED.</u>
<u>9. QUALITY</u>	
<u>ASSURANCE.....</u>	<u>ERROR!</u>
<u>BOOKMARK NOT DEFINED.</u>	
<u>10. PROMPT PAYMENT OF FUNDS WITHHELD TO</u>	
<u>SUBCONTRACTORS.....</u>	<u>ERROR! BOOKMARK NOT DEFINED.</u>
<u>11. FORM FHWA-1273 REQUIRED CONTRACT PROVISIONS FEDERAL-AID</u>	
<u>CONTRACTS...ERROR! BOOKMARK NOT DEFINED.</u>	
<u>12. FEMALE AND MINORITY GOALS.....</u>	<u>54</u>
<u>13. FEDERAL TRAINEE PROGRAM.....</u>	<u>55</u>
<u>14. TITLE VI ASSURANCE.....</u>	<u>57</u>
<u>15. USE OF UNITED STATES-FLAG VESSELS (CARGO PREFERENCE ACT).....</u>	<u>58</u>
<u>16. FORM TO DISCLOSE LOBBYING ACTIVITIES PURSUANT TO 31 U.S.C. 1352.....</u>	<u>60</u>

