



STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

**NOTICE TO BIDDERS
AND
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN ORANGE COUNTY IN
ANAHEIM AND FULLERTON FROM 0.3 MILE WEST OF BROOKHURST
STREET TO 0.2 MILE EAST OF STATE COLLEGE BOULEVARD AND NEAR
ANAHEIM AT ROUTE 55/91 SEPARATION AND IN IRVINE AT THE TRAFFIC
MANAGEMENT CENTER AT 6681 MARINE WAY**

In District 12 On Route 91

Under

Bid book dated October 1, 2012

Standard Specifications dated 2010

Project plans approved August 13, 2012

Standard Plans dated 2010

Identified by

Contract No. 12-0C5704

12-Ora-91-0.9/5.4

Project ID 1200000079

Electronic Advertising Contract

Bids open Thursday, November 29, 2012

Dated October 1, 2012

OSD

IH

CONTRACT NO. 12-0C5704

**The special provisions contained herein
have been prepared by or under the
direction of the following Registered Persons.**

STRUCTURES

Salahuddin M. Sheikh

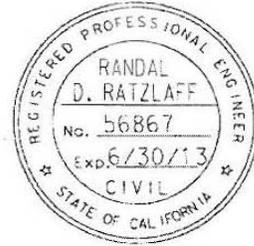
REGISTERED CIVIL ENGINEER



ROADWAY

Randal D. Ratzlaff

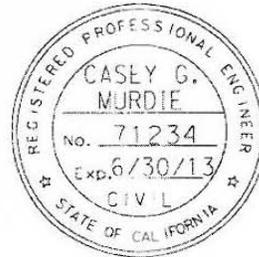
REGISTERED CIVIL ENGINEER



TRAFFIC AND ELECTRICAL

Casey Murdie

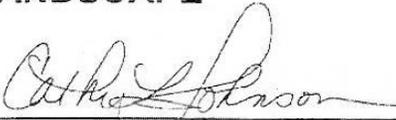
REGISTERED CIVIL ENGINEER



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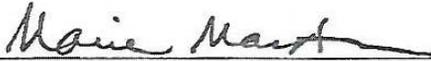
LANDSCAPE



REGISTERED CIVIL ENGINEER



TRAFFIC HANDLING



REGISTERED CIVIL ENGINEER



SPECIAL NOTICES

- See section 2-1.35 for SSPC QP certification requirements.

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The standard plan sheets applicable to this Contract include those listed below. The applicable revised standard plans (RSPs) listed below are included in the project plans.

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A62E	Excavation and Backfill - Cast-In-Place Reinforced Concrete Box and Arch Culverts
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P2	Jointed Plain Concrete Pavement - Widened Slab Details
RSP P10	Concrete Pavement - Dowel Bar Details
RSP P18	Concrete Pavement - Lane Schematics and Isolation Joint Detail
P20	Concrete Pavement - Joint Details
RSP P30	Concrete Pavement - End Panel Pavement Transitions
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D73	Drainage Inlets
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H5	Landscape Details
H6	Landscape Details
H7	Landscape Details
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T53	Temporary Water Pollution Control Details (Temporary Cover)
T56	Temporary Water Pollution Control Details (Temporary Fiber Roll)
T57	Temporary Water Pollution Control Details (Temporary Check Dam)
T58	Temporary Water Pollution Control Details (Temporary Construction Entrance)
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S86	Laminated Panel Details - Extrusions for Type A, B and H Panels
S87	Type A-1 Mounting Hardware - Overhead Laminated Type A Panel, Truss and Lightweight Sign Structures
S88	Type A-2 Mounting Hardware - Overhead Laminated Type A Panel, Bridge Mounted and Tubular Sign Structures
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S93	Framing Details for Framed Single Sheet Aluminum Signs, Rectangular Shape
S94	Roadside Framed Single Sheet Aluminum Signs, Rectangular Shape
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S101	Overhead Sign - Truss, Single Post Type, Layout, Unbalanced Butterfly Changeable Message Signs, Model 500
S102	Overhead Sign - Truss, Single Post Type, Structural Frame Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S103	Overhead Sign - Truss, Single Post Type, Plan and Upper Bolt Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S104	Overhead Sign - Truss, Single Post Type, Frame Juncture Details, Unbalanced Butterfly Changeable Message Signs, Model 500
S113	Overhead Sign - Truss, Single Post Type, Mounting Details, Changeable Message Signs, Model 500
S114	Overhead Sign - Truss, Single Post Type, Walkway Details, Changeable Message Signs, Model 500
S115	Overhead Sign - Truss, Single Post Type, Anchorage and Base Plate Details, Changeable Message Signs, Model 500
S116	Overhead Sign - Truss, Single Post Type, Foundation And Miscellaneous Details, Changeable Message Signs, Model 500
S140	Overhead Sign - Truss, Single Post Type, Walkway Safety Railing Details, Changeable Message Signs, Model 500 and 510
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ES-1A	Electrical Systems (Legend, Notes and Abbreviations)
ES-1B	Electrical Systems (Legend, Notes and Abbreviations)
ES-1C	Electrical Systems (Legend, Notes and Abbreviations)
ES-2A	Electrical Systems (Service Equipment)
ES-2E	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram, Type III - B Series)
ES-2F	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram Type III - C Series)
ES-3C	Electrical Systems (Controller Cabinet Foundation Details)
ES-3H	Electrical Systems (Irrigation Controller Enclosure Cabinet)
ES-4A	Electrical Systems (Signal Heads and Mountings)
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ES-4C	Electrical Systems (Vehicular Signal Heads and Mountings)
ES-4D	Electrical Systems (Signal Mounting)
ES-4E	Electrical Systems (Signal Faces and Emergency Vehicle Detector Mountings)
ES-5A	Electrical Systems (Detectors)
ES-5B	Electrical Systems (Detectors)
ES-5C	Electrical Systems (Detector, Pedestrian Push Button and Signs)
ES-5D	Electrical Systems (Curb Termination and Handhole)
ES-6A	Electrical Systems (Lighting Standard, Types 15 and 21)
ES-6B	Electrical Systems (Electrolier Anchorage and Grouting for Types 15 and 21, Barrier Rail Mounted)
ES-6E	Electrical Systems (Lighting Standard, Types 30 and 31)
ES-6F	Electrical Systems (Lighting Standard, Slip Base Plate)

ES-7B	Electrical Systems (Signal and Lighting Standard - Type 1 and Equipment Numbering)
ES-7E	Electrical Systems (Signal and Lighting Standard - Case 3 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 45')
ES-7F	Electrical Systems (Signal and Lighting Standard - Case 4 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 25' to 45')
ES-7G	Electrical Systems (Signal And Lighting Standard - Case 5 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 50' to 55')
ES-7M	Electrical Systems (Signal and Lighting Standard - Detail No. 1)
ES-7N	Electrical Systems (Signal and Lighting Standard - Detail No. 2)
ES-7O	Electrical Systems (Signal and Lighting Standard - Detail No. 3)
ES-7Q	Electrical Systems (Pedestrian Barricades)
RSP ES-8A	Electrical Systems (Pull Box)
RSP ES-8B	Electrical Systems (Traffic Rated Pull Box)
ES-9A	Electrical Systems (Structure Pull Box Installations)
ES-9B	Electrical Systems (Conduit Riser and Expansion Fitting, Structure Installations)
ES-9C	Electrical Systems (Structure Pull Box)
ES-9D	Electrical Systems (Structure Pull Box Installations)
RSP ES-10A	Electrical Systems (Isofootcandle Diagrams)
RSP ES-10B	Electrical Systems (Isofootcandle Diagrams)
ES-11	Electrical Systems (Foundation Installations)
ES-13A	Electrical Systems (Splicing Details)
ES-13B	Electrical Systems (Fuse Rating, Kinking and Banding Detail)
ES-15A	Electrical Systems (Sign Illumination Equipment)
ES-15C	Electrical Systems (Sign Illumination Equipment)
ES-15D	Electrical Systems (Lighting and Sign Illumination Control)
ES-16A	Electrical Systems (Closed Circuit Television, 5' to 15' Overhead Sign Mounted Pole)

CANCELED STANDARD PLANS LIST

The standard plan sheets listed below are canceled and not applicable to this contract.

B3-1	Canceled on April 20, 2012
B3-2	Canceled on April 20, 2012
B3-3	Canceled on April 20, 2012
B3-4	Canceled on April 20, 2012
B3-7	Canceled on April 20, 2012
B3-8	Canceled on April 20, 2012
ES-8	Canceled on January 20, 2012
ES-10	Canceled on July 20, 2012

NOTICE TO BIDDERS

Bids open Thursday, November 29, 2012

Dated October 1, 2012

General work description: Route 91 westbound improvements of ramps and bridge widening

The Department will receive sealed bids for CONSTRUCTION ON STATE HIGHWAY IN ORANGE COUNTY IN ANAHEIM AND FULLERTON FROM 0.3 MILE WEST OF BROOKHURST STREET TO 0.2 MILE EAST OF STATE COLLEGE BOULEVARD AND NEAR ANAHEIM AT ROUTE 55/91 SEPARATION AND IN IRVINE AT THE TRAFFIC MANAGEMENT CENTER AT 6681 MARINE WAY.

District-County-Route-Post Mile: 12-Ora-91-0.9/5.4

Contract No. 12-0C5704

The Contractor must have either a Class A license or a combination of Class C licenses which constitutes a majority of the work.

The Department establishes no DVBE Contract goal but encourages bidders to obtain DVBE participation.

Bids must be on a unit price basis.

Complete the work within 600 working days.

The estimated cost of the project is \$36,000,000.

No prebid meeting is scheduled for this project.

The Department will receive bids until 2:00 p.m. on the bid open date at 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692. Bids received after this time will not be accepted.

The Department will open and publicly read the bids at the above location immediately after the specified closing time.

District office addresses are provided in the *Standard Specifications*.

Present bidders' inquiries to the Department and view the Department's responses at:

http://www.dot.ca.gov/hq/esc/oe/project_status/bid_inq.html

Questions about alleged patent ambiguity of the plans, specifications, or estimate must be asked before bid opening. After bid opening, the Department does not consider these questions as bid protests.

Submit your bid with bidder's security equal to at least 10 percent of the bid.

Under Govt Code § 14835 et seq. and 2 CA Code of Regs § 1896 et seq., the Department gives preference to certified small businesses and non-small businesses who commit to 25 percent certified small business participation.

Under Pub Cont Code § 6107, the Department gives preference to a "California company," as defined, for bid comparison purposes over a nonresident contractor from any state that gives or requires a preference to be given to contractors from that state on its public entity construction contracts.

Prevailing wages are required on this Contract. The Director of the California Department of Industrial Relations determines the general prevailing wage rates. Obtain the wage rates at the DIR Web site, <http://www.dir.ca.gov>, or from the Department's Labor Compliance Office of the district in which the work is located.

The Department has made available Notices of Suspension and Proposed Debarment from the Federal Highway Administration. For a copy of the notices, go to http://www.dot.ca.gov/hq/esc/oe/contractor_info. Additional information is provided in the Excluded Parties List System at <https://www.epls.gov>.

Department of Transportation

THM

COPY OF BID ITEM LIST

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
1	070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
2	024676	TEMPORARY FENCE (TYPE CL-6, WITH PRIVACY SCREEN)	LF	2,110
3	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
4	074028	TEMPORARY FIBER ROLL	LF	16,500
5	074031	TEMPORARY GRAVEL BAG BERM	LF	350
6	074033	TEMPORARY CONSTRUCTION ENTRANCE	EA	6
7	074035	TEMPORARY CHECK DAM	LF	1,110
8	074038	TEMPORARY DRAINAGE INLET PROTECTION	EA	150
9	074040	TEMPORARY HYDRAULIC MULCH (BONDED FIBER MATRIX)	SQYD	23,600
10	074041	STREET SWEEPING	LS	LUMP SUM
11	074043	TEMPORARY CONCRETE WASHOUT BIN	EA	11
12	074056	RAIN EVENT ACTION PLAN	EA	36
13	074057	STORM WATER ANNUAL REPORT	EA	3
14	074058	STORM WATER SAMPLING AND ANALYSIS DAY	EA	30
15	090100	TIME-RELATED OVERHEAD (WDAY)	WDAY	600
16	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
17	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
18	120120	TYPE III BARRICADE	EA	25
19	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	320
20	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	190,000

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21	120165	CHANNELIZER (SURFACE MOUNTED)	EA	540
22	120300	TEMPORARY PAVEMENT MARKER	EA	14,300
23	128652	PORTABLE CHANGEABLE MESSAGE SIGN (LS)	LS	LUMP SUM
24	129000	TEMPORARY RAILING (TYPE K)	LF	42,200
25	129100	TEMPORARY CRASH CUSHION MODULE	EA	680
26	129150	TEMPORARY TRAFFIC SCREEN	LF	39,900
27	130100	JOB SITE MANAGEMENT	LS	LUMP SUM
28	141120	TREATED WOOD WASTE	LB	48,000
29	148005	NOISE MONITORING	LS	LUMP SUM
30	150204	ABANDON CULVERT (LF)	LF	1,660
31	150209	ABANDON DRAINAGE FACILITY	EA	1
32	150608	REMOVE CHAIN LINK FENCE	LF	2,320
33	150620	REMOVE GATE	EA	4
34	150662	REMOVE METAL BEAM GUARD RAILING	LF	3,010
35	150685	REMOVE IRRIGATION FACILITY	LS	LUMP SUM
36	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	151,000
37	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	2,430
38	150722	REMOVE PAVEMENT MARKER	EA	11,000
39	150742	REMOVE ROADSIDE SIGN	EA	95
40	150757	REMOVE SIGN STRUCTURE (EA)	EA	11

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	024677	REMOVE OVERHEAD SIGN PANEL	EA	5
42	024678	REMOVE BRIDGE MOUNTED SIGN PANEL	EA	3
43	150776	REMOVE DRAINAGE FACILITY (EA)	EA	13
44	150801	REMOVE OVERSIDE DRAIN	EA	6
45	150809	REMOVE CULVERT (LF)	LF	1,510
46	150814	REMOVE DOWNDRAIN (EA)	EA	4
47	150820	REMOVE INLET	EA	28
48	150832	REMOVE RETAINING WALL (CY)	CY	1,410
49	150853	REMOVE CONCRETE PAVEMENT (SQYD)	SQYD	180
50	024679	REMOVE ROCK BLANKET	CY	610
51	024680	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 1	LS	LUMP SUM
52	024681	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 2	LS	LUMP SUM
53	024682	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 3	LS	LUMP SUM
54	024683	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 4	LS	LUMP SUM
55	024684	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 5	LS	LUMP SUM
56	024685	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 6	LS	LUMP SUM
57	024686	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 7	LS	LUMP SUM
58	024687	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 8	LS	LUMP SUM
59	024688	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 9	LS	LUMP SUM
60	024689	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 10	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61	024690	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 11	LS	LUMP SUM
62	024691	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 12	LS	LUMP SUM
63	024692	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 13	LS	LUMP SUM
64	024693	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 14	LS	LUMP SUM
65	024694	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 15	LS	LUMP SUM
66	152356	RELOCATE IRRIGATION FACILITIES	LS	LUMP SUM
67	152390	RELOCATE ROADSIDE SIGN	EA	9
68	152430	ADJUST INLET	EA	14
69	152432	ADJUST MANHOLE	EA	6
70	153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	SQYD	12,700
71	153130	REMOVE CONCRETE CURB (LF)	LF	1,760
72	153140	REMOVE CONCRETE SIDEWALK (SQYD)	SQYD	670
73	153220	REMOVE CONCRETE (CHANNEL)	CY	140
74	153221	REMOVE CONCRETE BARRIER	LF	1,400
75	153225	PREPARE CONCRETE BRIDGE DECK SURFACE	SQFT	3,683
76	153247	REMOVE CONCRETE (MISCELLANEOUS) (CY)	CY	250
77	153253	REMOVE SOUND WALL (SQFT)	SQFT	38,800
78	155003	CAP INLET	EA	8
79	157560	BRIDGE REMOVAL (PORTION)	LS	LUMP SUM
80	157561	BRIDGE REMOVAL (PORTION), LOCATION A	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	157562	BRIDGE REMOVAL (PORTION), LOCATION B	LS	LUMP SUM
82	157563	BRIDGE REMOVAL (PORTION), LOCATION C	LS	LUMP SUM
83	157564	BRIDGE REMOVAL (PORTION), LOCATION D	LS	LUMP SUM
84	157565	BRIDGE REMOVAL (PORTION), LOCATION E	LS	LUMP SUM
85	157566	BRIDGE REMOVAL (PORTION), LOCATION F	LS	LUMP SUM
86	160102	CLEARING AND GRUBBING (LS)	LS	LUMP SUM
87	190101	ROADWAY EXCAVATION	CY	70,300
88	190110	LEAD COMPLIANCE PLAN	LS	LUMP SUM
89 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	1,689
90 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	CY	18,385
91 (F)	192060	STRUCTURE EXCAVATION (GROUND ANCHOR WALL)	CY	11
92 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	1,202
93 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	17,239
94 (F)	193017	STRUCTURE BACKFILL (CHANNEL)	CY	351
95 (F)	193027	STRUCTURE BACKFILL (GROUND ANCHOR WALL)	CY	5
96	193114	SAND BACKFILL	CY	250
97 (F)	193118	CONCRETE BACKFILL	CY	43
98	198010	IMPORTED BORROW (CY)	CY	4,810
99	200002	ROADSIDE CLEARING	LS	LUMP SUM
100	200114	ROCK BLANKET	SQYD	23

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101	203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	4
102	204096	MAINTAIN EXISTING PLANTED AREAS	LS	LUMP SUM
103	206400	CHECK AND TEST EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
104	206401	MAINTAIN EXISTING IRRIGATION FACILITIES	LS	LUMP SUM
105	206560	CONTROL AND NEUTRAL CONDUCTORS	LS	LUMP SUM
106	206601	3/4" ELECTRIC REMOTE CONTROL VALVE	EA	4
107 (F)	208044	3" GALVANIZED STEEL PIPE (SUPPLY LINE ON BRIDGE)	LF	80
108	208465	SPRINKLER (TYPE A-5)	EA	45
109	208467	SPRINKLER (TYPE A-7)	EA	9
110	208481	SPRINKLER (TYPE C-1)	EA	12
111	208574	1 1/2" GATE VALVE	EA	3
112 (F)	208595	1" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	EA	1,240
113 (F)	208597	1 1/2" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	1,020
114 (F)	208598	2" PLASTIC PIPE (SCHEDULE 40) (SUPPLY LINE)	LF	2,200
115	208683	BALL VALVE	EA	5
116 (F)	208738	8" CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	LF	70
117	210300	HYDROMULCH	SQFT	310,000
118	210430	HYDROSEED	SQFT	310,000
119	250201	CLASS 2 AGGREGATE SUBBASE	CY	4,050
120	260203	CLASS 2 AGGREGATE BASE (CY)	CY	18,800

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
121	260210	AGGREGATE BASE (APPROACH SLAB)	CY	21
122	280000	LEAN CONCRETE BASE	CY	1,690
123	024695	LEAN CONCRETE BASE RAPID SETTING	CY	1,150
124	290201	ASPHALT TREATED PERMEABLE BASE	CY	1,440
125	290301	CEMENT TREATED PERMEABLE BASE	CY	180
126	377501	SLURRY SEAL	TON	130
127	390010	PREPAVING PROFILOGRAPH	LS	LUMP SUM
128	390020	PREPAVING GRINDING DAY	EA	3
129	390131	HOT MIX ASPHALT	TON	17,400
130	390137	RUBBERIZED HOT MIX ASPHALT (GAP GRADED)	TON	8,730
131	390138	RUBBERIZED HOT MIX ASPHALT (OPEN GRADED)	TON	440
132	394060	DATA CORE	LS	LUMP SUM
133	394073	PLACE HOT MIX ASPHALT DIKE (TYPE A)	LF	270
134	394074	PLACE HOT MIX ASPHALT DIKE (TYPE C)	LF	530
135	394076	PLACE HOT MIX ASPHALT DIKE (TYPE E)	LF	6,670
136	394077	PLACE HOT MIX ASPHALT DIKE (TYPE F)	LF	330
137	394090	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	SQYD	280
138	397005	TACK COAT	TON	15
139	401050	JOINTED PLAIN CONCRETE PAVEMENT	CY	5,030
140	024696	JOINTED PLAIN CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)	CY	3,270

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
141	404092	SEAL PAVEMENT JOINT	LF	7,150
142	404093	SEAL ISOLATION JOINT	LF	8,680
143	460210	GROUND ANCHOR (SUBHORIZONTAL)	EA	10
144	044059	32" PERMANENT STEEL CASING	LF	8
145	490591	60" PERMANENT STEEL CASING	LF	10
146	490601	16" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	16,811
147	490603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	1,706
148	490615	18" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	1,554
149 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	449
150 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	870
151 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	5,331
152 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	143
153	510087	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R)	CY	28
154 (F)	510090	STRUCTURAL CONCRETE, BOX CULVERT	CY	1,451
155 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	242
156 (F)	511035	ARCHITECTURAL TREATMENT	SQFT	5,561
157 (F)	511064	FRACTURED RIB TEXTURE	SQFT	41,980
158	511106	DRILL AND BOND DOWEL	LF	1,649
159	044060	FURNISH PRECAST PRESTRESSED CONCRETE RECTANGULAR GIRDER (70'-80')	EA	6
160	044061	FURNISH PRECAST PRESTRESSED CONCRETE TRAPEZOIDAL GIRDER (70'-80')	EA	2

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
161	512353	FURNISH PRECAST PRESTRESSED CONCRETE SLAB (TYPE SIII)	SQFT	2,447
162	044062	FURNISH PRECAST PRESTRESSED CONCRETE SLAB (TYPE SIV) (MODIFIED)	SQFT	1,462
163 (F)	512500	ERECT PRECAST PRESTRESSED CONCRETE GIRDER	EA	8
164 (F)	512510	ERECT PRECAST PRESTRESSED CONCRETE DECK UNIT	EA	36
165	515020	REFINISH BRIDGE DECK	SQFT	290
166	515041	FURNISH POLYESTER CONCRETE OVERLAY	CF	461
167 (F)	515042	PLACE POLYESTER CONCRETE OVERLAY	SQFT	3,683
168 (F)	518002	SOUND WALL (MASONRY BLOCK)	SQFT	35,475
169	519081	JOINT SEAL (MR 1/2")	LF	343
170 (F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	348,330
171 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	734,987
172 (F)	520107	BAR REINFORCING STEEL (BOX CULVERT)	LB	298,837
173 (F)	520120	HEADED BAR REINFORCEMENT	EA	1,495
174 (F)	530200	STRUCTURAL SHOTCRETE	CY	8
175 (F)	540101	ASPHALT MEMBRANE WATERPROOFING	SQFT	852
176 (F)	550110	COLUMN CASING	LB	82,000
177 (F)	550203	FURNISH STRUCTURAL STEEL (BRIDGE)	LB	138,740
178 (F)	550204	ERECT STRUCTURAL STEEL (BRIDGE)	LB	138,740
179 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	250,000
180 (F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	250,000

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
181 (F)	560223	FURNISH SIGN STRUCTURE (BRIDGE MOUNTED WITHOUT WALKWAY)	LB	2,532
182 (F)	560224	INSTALL SIGN STRUCTURE (BRIDGE MOUNTED WITHOUT WALKWAY)	LB	2,532
183	560244	FURNISH LAMINATED PANEL SIGN (1"-TYPE A)	SQFT	3,400
184	560245	FURNISH LAMINATED PANEL SIGN (1"-TYPE B)	SQFT	190
185	560248	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)	SQFT	570
186	560249	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)	SQFT	800
187	560251	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-FRAMED)	SQFT	290
188	560252	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-FRAMED)	SQFT	20
189	024697	16" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	190
190	561014	54" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	100
191	561016	60" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	LF	180
192	562004	METAL (RAIL MOUNTED SIGN)	LB	1,020
193	566011	ROADSIDE SIGN - ONE POST	EA	67
194	566012	ROADSIDE SIGN - TWO POST	EA	6
195	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	14
196	568016	INSTALL SIGN PANEL ON EXISTING FRAME	SQFT	550
197	024698	INSTALL ROADWAY SIGN PANEL	EA	5
198 (F)	570115	ABUTMENT LUMBER BLOCKING	MFBM	4.5
199	590115	CLEAN AND PAINT STRUCTURAL STEEL	LS	LUMP SUM
200	620100	18" ALTERNATIVE PIPE CULVERT	LF	780

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
201	620140	24" ALTERNATIVE PIPE CULVERT	LF	4,260
202	620220	36" ALTERNATIVE PIPE CULVERT	LF	160
203	024699	4" PLASTIC PIPE	LF	240
204	650018	24" REINFORCED CONCRETE PIPE	LF	20
205	665116	18" BITUMINOUS COATED CORRUGATED STEEL PIPE (.064" THICK)	LF	50
206	665122	24" BITUMINOUS COATED CORRUGATED STEEL PIPE (.064" THICK)	LF	90
207	665816	18" BITUMINOUS COATED SLOTTED CORRUGATED STEEL PIPE (.064" THICK)	LF	140
208	681103	3" PLASTIC PIPE (EDGE DRAIN)	LF	9,040
209	681107	3" PLASTIC PIPE (EDGE DRAIN OUTLET)	LF	840
210	700617	DRAINAGE INLET MARKER	EA	2
211	700640	36" CORRUGATED STEEL PIPE INLET (.138" THICK)	LF	18
212	705311	18" ALTERNATIVE FLARED END SECTION	EA	4
213	705315	24" ALTERNATIVE FLARED END SECTION	EA	2
214	707417	36" PRECAST CONCRETE PIPE RISER	LF	21
215	708037	12" ALTERNATIVE PIPE RISER	LF	22
216 (F)	721017	ROCK SLOPE PROTECTION (FACING, METHOD B) (CY)	CY	99
217	721430	CONCRETE (CHANNEL LINING)	CY	270
218	721810	SLOPE PAVING (CONCRETE)	CY	88
219	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	340
220	730020	MINOR CONCRETE (CURB) (CY)	CY	110

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
221	730045	MINOR CONCRETE (GUTTER) (CY)	CY	50
222	730070	DETECTABLE WARNING SURFACE	SQFT	60
223	731519	MINOR CONCRETE (STAMPED CONCRETE)	SQFT	1,670
224	024700	MINOR CONCRETE (PATTERNED)	CY	170
225	731521	MINOR CONCRETE (SIDEWALK)	CY	80
226	731623	MINOR CONCRETE (CURB RAMP)	CY	4
227 (F)	750001	MISCELLANEOUS IRON AND STEEL	LB	49,013
228 (F)	750501	MISCELLANEOUS METAL (BRIDGE)	LB	13,470
229	800320	CHAIN LINK FENCE (TYPE CL-4)	LF	690
230	800360	CHAIN LINK FENCE (TYPE CL-6)	LF	990
231	802501	4' CHAIN LINK GATE (TYPE CL-6)	EA	2
232	802560	10' CHAIN LINK GATE (TYPE CL-6)	EA	2
233	820118	GUARD RAILING DELINEATOR	EA	80
234	832003	METAL BEAM GUARD RAILING (WOOD POST)	LF	630
235	832070	VEGETATION CONTROL (MINOR CONCRETE)	SQYD	780
236 (F)	833032	CHAIN LINK RAILING (TYPE 7)	LF	244
237	833077	PEDESTRIAN BARRICADE	EA	6
238	839401	CONCRETE BARRIER	LF	7,820
239 (F)	839521	CABLE RAILING	LF	330
240	839541	TRANSITION RAILING (TYPE WB)	EA	11

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
241	024701	CONCRETE ANCHOR BLOCK CONNECT TO WALL	EA	2
242	839581	END ANCHOR ASSEMBLY (TYPE SFT)	EA	1
243	839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	3
244	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	8
245	839604	CRASH CUSHION (REACT 9CBB)	EA	2
246 (F)	839704	CONCRETE BARRIER (TYPE 60D)	LF	182
247 (F)	839725	CONCRETE BARRIER (TYPE 736)	LF	236
248 (F)	839727	CONCRETE BARRIER (TYPE 736 MODIFIED)	LF	6,609
249 (F)	839734	CONCRETE BARRIER (TYPE 736SV)	LF	1,557
250 (F)	839735	CONCRETE BARRIER (TYPE 742)	LF	246
251	840502	THERMOPLASTIC TRAFFIC STRIPE (ENHANCED WET NIGHT VISIBILITY)	LF	4,310
252	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	57,300
253	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	11,800
254	840508	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	8,510
255	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	5,700
256	840516	THERMOPLASTIC PAVEMENT MARKING (ENHANCED WET NIGHT VISIBILITY)	SQFT	70
257	840525	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12)	LF	67,400
258	840526	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)	LF	10,100
259	840550	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 36-12)	LF	22,700
260	840656	PAINT TRAFFIC STRIPE (2-COAT)	LF	91,700

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
261	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	5,800
262	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	7,200
263	860090	MAINTAINING EXISTING TRAFFIC MANAGEMENT SYSTEM ELEMENTS DURING CONSTRUCTION	LS	LUMP SUM
264	024702	TEMPORARY ELECTRICAL SERVICE (LOCATION 1) (STAGE 1A.1 AND 1A)	LS	LUMP SUM
265	024703	TEMPORARY ELECTRICAL SERVICE (LOCATION 2) (STAGE 2A.1 AND 2A)	LS	LUMP SUM
266	024704	TEMPORARY ELECTRICAL SERVICE (LOCATION 3) (STAGE 1A.1 AND 1A)	LS	LUMP SUM
267	860415	LIGHTING (STAGE CONSTRUCTION)	LS	LUMP SUM
268	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
269	860532	CHANGEABLE MESSAGE SIGN SYSTEM (LS)	LS	LUMP SUM
270	860797	ELECTRIC SERVICE (IRRIGATION)	LS	LUMP SUM
271	860931	TRAFFIC MONITORING STATION (LOCATION 1)	LS	LUMP SUM
272	860932	TRAFFIC MONITORING STATION (LOCATION 2)	LS	LUMP SUM
273	860990	CLOSED CIRCUIT TELEVISION SYSTEM	LS	LUMP SUM
274	861101	RAMP METERING SYSTEM (LOCATION 1)	LS	LUMP SUM
275	861102	RAMP METERING SYSTEM (LOCATION 2)	LS	LUMP SUM
276	861103	RAMP METERING SYSTEM (LOCATION 3)	LS	LUMP SUM
277	861104	RAMP METERING SYSTEM (LOCATION 4)	LS	LUMP SUM
278	861105	RAMP METERING SYSTEM (LOCATION 5)	LS	LUMP SUM
279	024705	RAMP METERING SYSTEM (LOCATION 6)	LS	LUMP SUM
280	861497	MODIFY SIGNAL AND LIGHTING (LOCATION 1)	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
281	861498	MODIFY SIGNAL AND LIGHTING (LOCATION 2)	LS	LUMP SUM
282	861499	MODIFY SIGNAL AND LIGHTING (LOCATION 3)	LS	LUMP SUM
283	024706	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 1)	LS	LUMP SUM
284	024707	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 2)	LS	LUMP SUM
285	024708	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 3)	LS	LUMP SUM
286	024709	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 4)	LS	LUMP SUM
287	024710	TEMPORARY COMMUNICATION SYSTEM	LS	LUMP SUM
288	024711	COMMUNICATION SYSTEM	LS	LUMP SUM
289	869050	GUARD POST	EA	10
290	869075	SYSTEM TESTING AND DOCUMENTATION	LS	LUMP SUM
291	999990	MOBILIZATION	LS	LUMP SUM

SPECIAL PROVISIONS

DIVISION I GENERAL PROVISIONS

1 GENERAL

Add to section 1-1.01:

Bid Items and Applicable Sections

Item code	Item description	Applicable section
070012	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	8
024676	TEMPORARY FENCE (TYPE CL-6, WITH PRIVACY SCREEN)	80
074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	13
074028	TEMPORARY FIBER ROLL	13
074031	TEMPORARY GRAVEL BAG BERM	13
074033	TEMPORARY CONSTRUCTION ENTRANCE	13
074035	TEMPORARY CHECK DAM	13
074038	TEMPORARY DRAINAGE INLET PROTECTION	13
074040	TEMPORARY HYDRAULIC MULCH (BONDED FIBER MATRIX)	13
074041	STREET SWEEPING	13
074043	TEMPORARY CONCRETE WASHOUT BIN	13
074056	RAIN EVENT ACTION PLAN	13
074057	STORM WATER ANNUAL REPORT	13
074058	STORM WATER SAMPLING AND ANALYSIS DAY	13
024677	REMOVE OVERHEAD SIGN PANEL	15
024678	REMOVE BRIDGE MOUNTED SIGN PANEL	15
024679	REMOVE ROCK BLANKET	15
024680	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 1	15
024681	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 2	15
024682	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 3	15
024683	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 4	15
024684	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 5	15
024685	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 6	15
024686	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 7	15
024687	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 8	15
024688	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 9	15
024689	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 10	15
024690	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 11	15
024691	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 12	15
024692	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 13	15
024693	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 14	15
024694	TEMPORARY CONSTRUCTION EASEMENT DEMOLITION REMOVAL LOCATION 15	15
190110	LEAD COMPLIANCE PLAN	7
193114	SAND BACKFILL	15
203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	21

Item code	Item description	Applicable section
024695	LEAN CONCRETE BASE RAPID SETTING	28
024696	JOINTED PLAIN CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)	40
044059	32" PERMANENT STEEL CASING	49
044060	FURNISH PRECAST PRESTRESSED CONCRETE RECTANGULAR GIRDER (70'-80')	51
044061	FURNISH PRECAST PRESTRESSED CONCRETE TRAPEZOIDAL GIRDER (70'-80')	51
044062	FURNISH PRECAST PRESTRESSED CONCRETE SLAB (TYPE SIV) (MODIFIED)	51
515020	REFINISH BRIDGE DECK	15
515041	FURNISH POLYESTER CONCRETE OVERLAY	15
515042	PLACE POLYESTER CONCRETE OVERLAY	15
518002	SOUND WALL (MASONRY BLOCK)	58
024697	16" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	49
561014	54" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	49
561016	60" CAST-IN-DRILLED-HOLE CONCRETE PILE (SIGN FOUNDATION)	49
024698	INSTALL ROADSIDE SIGN PANEL	56
024699	4" PLASTIC PIPE	64
024700	MINOR CONCRETE (PATTERNED)	73
024701	CONCRETE ANCHOR BLOCK CONNECT TO WALL	83
024702	TEMPORARY ELECTRICAL SERVICE (LOCATION 1) (STAGE 1A.1 AND 1A)	86
024703	TEMPORARY ELECTRICAL SERVICE (LOCATION 2) (STAGE 2A.1 AND 2A)	86
024704	TEMPORARY ELECTRICAL SERVICE (LOCATION 3) (STAGE 1A.1 AND 1A)	86
024705	RAMP METERING SYSTEM (LOCATION 6)	86
024706	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 1)	86
024707	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 2)	86
024708	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 3)	86
024709	MODIFY SIGNAL AND LIGHTING (TEMPORARY LOCATION 4)	86
024710	TEMPORARY COMMUNICATION SYSTEM	86
024711	COMMUNICATION SYSTEM	86

AA

2 BIDDING

2-1.03 MANDATORY PREBID MEETING

The Department will conduct a mandatory prebid meeting for this contract. The purpose of the meeting is to provide small businesses the opportunity to meet and interact with prospective bidders and increase their participation in the performance of contracts.

Each bidder must attend the mandatory prebid meeting. The bidder's representative must be a company officer, project superintendent, or project estimator. For a joint venture, 1 of the parties must attend the mandatory prebid meeting. The Department does not accept a bid from a bidder who did not attend the meeting.

Add to section 5-1.20A:

During the progress of the work under this Contract, work under the following contracts may be in progress at or near the job site of this Contract:

Coincident or Adjacent Contracts

Contract no.	County–Route–Post Mile	City	Type of work
12-0H0294	ORA-91-0.0/10/3	Anaheim/Fullerton	Slab replacement, pavement rehabilitation
12-0K5304	ORA-91-3.14/4.20	Anaheim/Fullerton	RHMA overlay and drainage improvements
C-9-0576 (OCTA) Contract	State College Blvd Grade Separation at BNSF Line	Fullerton	Roadway/railroad grade separation
C-9-0576 (OCTA) Contract	Raymond Ave Grade Separation at BNSF Line	Fullerton	Roadway/railroad grade separation
12-0G3304	91-Widening (55 to 241)	Anaheim/Yorba Linda	Lane addition, 1 each direction
12-0F0314	NB-57 Widening (Orangethorpe to Lambert)	Fullerton / Placentia / Brea	Roadway
12-0F0404	NB-57 Widening (Katella to Lincoln)	Anaheim	Roadway

Replace section 5-1.20E with:

5-1.20E Orange County Flood Control District Coordination

Obtain a rider to the encroachment permit issued by Orange County Flood Control District (OCFCD) to the Department, to be included as an additional permittee before working in OCFCD’s right-of-way. Include a copy of the authorized SWPPP with your application to OCFCD for the encroachment permit rider.

Replace section 5-1.20F:

5-1.20F Orange County Transportation Authority Coordination

Notify the Engineer and the OCTA Call Box Program Coordinator (714-560-5425) five business days before you need for the existing call boxes to be removed.

Add to section 5-1.20:

5-1.20G Local Agency Coordination

Obtain construction or encroachment permits from the City of Anaheim and the City of Fullerton before placing any temporary lane or shoulder closure on local roadways.

5-1.20H Private Property Coordination

You will have the use of the temporary construction easements (TCE) for a period not to exceed the duration specified in the following table, beginning with the first entry on the property.

Parcel no. (*)	Appraisal map	Duration (days)	Advance notice to Engineer (days)
102719-1	E120087-02	90	20
102720-1	E120087-02	90	20
102721-1	E120087-02	90	20
102722-1	E120087-02	90	20
102725-2	E120087-02	90	20
102753-2	E120087-05	90	20
102769-2	E120087-06	365	20
102770-2	E120087-06	365	20
102754-2	E120087-07	90	20
102755-2	E120087-07	90	20
102756-2	E120087-07	90	20
102757-2	E120087-07	90	20
102758-3	E120087-07	90	20
102759-3	E120087-07	60	30
102760-2	E120087-07	90	20
102761-1	E120087-07	90	20
102768-2	E120087-07	90	20
102764-2	E120087-08	365	20
102765-1	E120087-08	365	20

(*) For accurate right of way data, contact right of way engineering at the District office.

Begin work within Work Around Area A (parcel nos. 102725-1 and 102725-2) after March 31, 2013.

Begin work within Work Around Area B (parcel nos. 102753-1 and 102753-2) after January 24, 2013.

Begin work within Work Around Area C (parcel nos. 102768-1 and 102768-2) after January 24, 2013.

Begin work within Work Around Area D (parcel nos. 102764-1 and 102764-2) after May 31, 2013.

Begin work within Work Around Area E (parcel nos. 102769-1,2 and 102770-1,2) after January 31, 2013.

Before beginning work in a Work Around Area, receive advance written notice to enter that property.

To request extension of your use of a TCE, submit an RFI at least 20 working days before the date that your use of that TCE expires. You may be charged for costs incurred by the State for extending your use of the TCE.

Add to section 5-1.36D:

The utilities shown in the following table will not be rearranged. The utilities may interfere with pile driving, drilling activities, or substructure construction. If you want any of them rearranged or temporarily deactivated, make arrangements with the utility owner.

Utilities Not Rearranged for Pile Driving, Drilling Activities, or Substructure Construction

Utility	Location
Southern California Edison (SCE) 12kV Distribution OH Elec	Adjacent to RW No. 159
Southern California Edison (SCE) 12kV Distribution OH Elec	Over Euclid St UC
Anaheim Public Utilities Department (APUD) 12kv Distribution OH Elec	Over North Anaheim OH
Anaheim Public Utilities Department (APUD) 12kv Distribution OH Elec	Over East St UC

AA

DIVISION II GENERAL CONSTRUCTION 10 GENERAL

Add to section 10-1.02 of the RSS for section 10-1:

Before starting the traffic signal functional test at any location, all items of work related to signal control must be completed and all roadside signs, pavement delineation, and pavement markings must be in place at that location.

You may proceed with nonconflicting work in subsequent stages concurrently with work in preceding stages, if you maintain satisfactory progress in the preceding stages of construction.

Construct bent 2, bent 3, bent 4, and the seismic retrofit of the existing adjacent columns under East Street Undercrossing, bridge no. 55-0245, before you perform any work in stage 1A.

Construct abutment 1 and Retaining Wall no. 305 at the western end of the Acacia Street Undercrossing, bridge no. 55-0218, before you perform any work in stage 2A.1.

Construct abutment 3 and Retaining Wall no. 355 at the eastern end of State College Boulevard Undercrossing, bridge no. 55-0852, before you perform any work in stage 2A.

Replace "Reserved" in section 10-1.03 of the RSS for section 10-1 with:

You may work within Orange County Flood Control District drainage channels only from April 15 to October 15 of any year.

AA

12 TEMPORARY TRAFFIC CONTROL

Replace section 12-2 with:

12-2 CONSTRUCTION PROJECT FUNDING SIGNS

12-2.01 GENERAL

Section 12-2 includes specifications for installing construction project funding signs.

Details for construction project funding signs are shown.

Keep construction project funding signs clean and in good repair at all times.

12-2.02 MATERIALS

Construction project funding signs must be wood post signs complying with section 56-4.

Sign panels for construction project funding signs must be framed, single sheet aluminum panels complying with section 56-2.

The background on construction project funding signs must be Type II retroreflective sheeting on the Authorized Material List for signing and delineation materials.

The legend must be retroreflective, except for nonreflective black letters and numerals. The colors blue and orange must comply with PR Color no. 3 and no. 6, respectively, as specified in the Federal Highway Administration's *Color Tolerance Chart*.

The legend for the type of project on construction project funding signs must read as follows:

HIGHWAY CONSTRUCTION

The legend for the types of funding on construction project funding signs must read as follows and in the following order:

STATE HIGHWAY FUNDS

ORANGE COUNTY TRANSPORTATION AUTHORITY M2 FUNDS

The legend for the year of completion on construction project funding signs must read as follows:

COMPLETION 2015

The size of the legend on construction project funding signs must be as described. Do not add any additional information unless authorized.

12-2.03 CONSTRUCTION

Install 1 Type 2 construction project funding signs at the locations designated by the Engineer before starting major work activities visible to highway users.

When authorized, remove and dispose of construction project funding signs upon completion of the project.

12-2.04 PAYMENT

Not Used

Add to section 12-3.12C:

Start displaying the message on the portable changeable message sign 30 minutes before closing the lane.

Place the portable changeable message sign in advance of the 1st warning sign for each:

1. Stationary lane closure
2. Off-ramp closure
3. Shoulder closure

Replace section 12-3.13 with:

12-3.13 IMPACT ATTENUATOR VEHICLE

12-3.13A General

12-3.13A(1) Summary

Section 12-3.13 includes specifications for protecting traffic and workers with an impact attenuator vehicle during moving lane closures and when placing and removing components of stationary lane closures, ramp closures, shoulder closures, or a combination.

Impact attenuator vehicles must comply with the following test levels under National Cooperative Highway Research Program 350:

1. Test level 3 if the preconstruction posted speed limit is 50 mph or more
2. Test levels 2 or 3 if the preconstruction posted speed limit is 45 mph or less

Comply with the attenuator manufacturer's instructions for:

1. Support truck
2. Trailer-mounted operation
3. Truck-mounted operation

Flashing arrow signs must comply with section 12-3.03. You may use a portable changeable message sign instead of a flashing arrow sign. If a portable changeable message sign is used as a flashing arrow sign, it must comply with section 6F.56 "Arrow Panels" of the *California MUTCD*.

12-3.13A(2) Definitions

impact attenuator vehicle: A support truck that is towing a deployed attenuator mounted to a trailer or a support truck with a deployed attenuator that is mounted to the support truck.

12-3.13A(3) Submittals

Upon request, submit a certificate of compliance for each attenuator used on the project.

12-3.13A(4) Quality Control and Assurance

Do not start impact attenuator vehicle activities until authorized.

Before starting impact attenuator vehicle activities, conduct a preinstallation meeting with the Engineer, subcontractors, and other parties involved with traffic control to discuss the operation of the impact attenuator vehicle during moving lane closures and when placing and removing components of stationary traffic control systems.

Schedule the location, time, and date for the preinstallation meeting with all participants. Furnish the facility for the preinstallation meeting within 5 miles of the job site or at another location if authorized.

12-3.13B Materials

Attenuators must be a brand on the Authorized Material List for highway safety features.

The combined weight of the support truck and the attenuator must be at least 19,800 pounds, except the weight of the support truck must not be less than 16,100 or greater than 26,400 pounds.

For the Trinity MPS-350 truck-mounted attenuator, the support truck must not have a fuel tank mounted underneath within 10'-6" of the rear of the support truck.

Each impact attenuator vehicle must have:

1. Legal brake lights, taillights, sidelights, and turn signals
2. Inverted "V" chevron pattern placed across the entire rear of the attenuator composed of alternating 4-inch wide nonreflective black stripes and 4-inch wide yellow retroreflective stripes sloping at 45 degrees
3. Type II flashing arrow sign
4. Flashing or rotating amber light
5. Operable 2-way communication system for maintaining contact with workers

12-3.13C Construction

Except where prohibited, use an impact attenuator vehicle:

1. To follow behind equipment and workers who are placing and removing components of a stationary lane closure, ramp closure, shoulder closure, or any combination. Operate the flashing arrow sign in the arrow or caution mode during this activity, whichever applies. Follow at a distance that prevents intrusion into the workspace from passing traffic.
2. As a shadow vehicle in a moving lane closure.

After placing components of a stationary traffic control system you may place the impact attenuator vehicle in advance of the work area or at another authorized location to protect traffic and workers.

Secure objects, including equipment, tools, and ballast on impact attenuator vehicles to prevent loosening upon impact by an errant vehicle.

Do not use a damaged attenuator in the work. Replace any attenuator damaged from an impact during work activities at your expense.

12-3.13 Payment

Not Used

Replace section 12-3.14 with:

12-3.14 TEMPORARY TRAFFIC SCREEN

12-3.14A General

Section 12-3.14 includes specifications for constructing temporary traffic screen at the locations shown.

12-3.14B Materials

Temporary traffic screen panels must be new or used, CDX grade or better, plywood or weather-resistant strandboard mounted and anchored on Type K temporary railing.

Wale boards must be new or used Douglas fir, rough sawn, construction grade or better.

Pipe screen supports must be new or used schedule 40, galvanized steel pipe.

Nuts, bolts, and washers must be cadmium plated.

Screws must be black or cadmium-plated flat head, cross-slotted screws with full thread length.

12-3.14C Construction

Mount and anchor temporary traffic screen on top of Type K temporary railing.

Remove the traffic screen from the highway when the Engineer determines it is no longer required. The traffic screen that is removed becomes your property.

A lateral move of Type K temporary railing with attached temporary traffic screen is change order work if ordered and the repositioning is not shown.

12-3.14D Payment

Temporary traffic screen is measured along the line of the completed screen.

Add to section 12-4.01:

Provide the work plan for authorization 15 working days before any closure of the following areas:

1. Westbound Brookhurst Street on ramp, "BH1" line, stages 1A & 1B
2. Westbound Brookhurst Street off ramp, "BH2" line, stages 1A & 1B
3. Westbound Euclid Street on ramp, "EU1" line, stages 1A, 2A & 2B
4. Westbound Euclid Street off ramp, "EU2" line, stages 2A & 2B
5. Westbound Harbor Boulevard on ramp, "HB1" line, stages 2A & 2B
6. Westbound Lemon Street off ramp, "LM1" line, stage 1A
7. Westbound Raymond Ave on ramp, "RA1" line, stages 1A & 1B
8. Westbound Raymond Ave off ramp, "RA2" line, stages 1A & 1B
9. Westbound State College Boulevard on ramp, "SC1" line, stages 2A & 2B
10. Westbound State College Boulevard off ramp, "SC2" line, stages 2A & 2B
11. Brookhurst Street, stages 1A.1, 1A.2, & 1A.3
12. Euclid Street, stages 2A.1, 2A.2, & 2A.3
13. East St/Raymond Ave, stages 1A.1, 1A.2, & 1A.3
14. Acacia Street, stage 2A.1
15. State College Boulevard, stages 2A.1, 2A.2, & 2A.3

Provide the work plan for authorization 15 working days before the closure of westbound Route 91 and eastbound Route 91 HOV lane for the removal of the existing, and installation of the new, sign bridge structure west of Brookhurst Street.

Add to section 12-4.02A:

If work including installing, maintaining, and removing Type K temporary railing is to be performed within 6 feet of the adjacent traffic lane, close the adjacent traffic lane.

Except as listed above, closure of the adjacent traffic lane is not required for installing, maintaining, and removing traffic control devices.

For grinding operations, closure of the adjacent traffic lane is not required.

Designated holidays are as shown in the following table:

Designated Holidays	
Holiday	Date observed
New Year's Day	January 1st
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4th
Labor Day	1st Monday in September
Veterans Day	November 11th
Thanksgiving Day	4th Thursday in November
Christmas Day	December 25th

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

Special days are: day after Thanksgiving, Lincoln's Birthday, Washington's Birthday, and Columbus Day and December 24 through January 2.

The maximum length of a single stationary lane closure is 1.5 miles.

Not more than 1 stationary lane closures will be allowed in each direction of travel at 1 time.-Personal vehicles of your employees must not be parked on the traveled way or shoulders, including sections closed to traffic.

If work vehicles or equipment are parked within 6 feet of a traffic lane, close the shoulder area as shown.

At each location where falsework is constructed over a street or route listed, provide openings through the bridge falsework. The type, minimum width, height, and number of openings at each location, and the location and maximum spacing of the falsework lighting, if required for each opening, must comply with the requirements shown in the table. The width of vehicular openings is the clear width between temporary railings or other protective work. The spacing shown in the table for falsework pavement lighting is the maximum distance from center to center, in feet, between fixtures.

Acacia Street UC (Bridge No. 55-0218)

	Number	Width (feet)	Height (feet)
Vehicle openings	1	32	15
Pedestrian openings	1	5	15
	Location	Spacing	
Falsework pavement lighting	R & L	30' staggered 1/2 space	
NOTE: R = Right side of traffic L = Left side of traffic C = Centered overhead			

East Street UC (Bridge No. 55-0245)

	Number	Width (feet)	Height (feet)
Pedestrian openings	1	5	15

Euclid Street UC (Bridge No. 55-0279)

	Number	Width (feet)	Height (feet)
Pedestrian openings	1	5	15

Brookhurst Ave UC (Bridge No. 55-0280)

	Number	Width (feet)	Height (feet)
Pedestrian openings	1	5	15

State College Blvd UC (Bridge No. 55-0852)

	Number	Width (feet)	Height (feet)
Vehicle openings	2	48	15
Pedestrian openings	1	5	15
	Location	Spacing	
Falsework pavement lighting	R & L	22'-6"	
NOTE: R = Right side of traffic L = Left side of traffic C = Centered overhead			

The exact location of openings will be determined by the Engineer.

Precast concrete members must not be cast within the right-of-way of Route 91.

Erect steel girders at North Anaheim Overhead and over Acacia Street, precast prestressed slabs over East Street, Euclid Street and Brookhurst Avenue, and precast prestressed girders over State College Boulevard 1 span at a time. During girder erection, traffic in the lanes over which girders are being placed must be detoured or stopped as specified in section 12-4.02A.

Have the necessary materials and equipment on site to erect or remove the girders in any 1 span or over any 1 opening before detouring or stopping traffic.

Replace "Reserved" in section 12-4.04 with:

Lane Closure Restriction for Designated Holidays and Special Days										
Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	H xx	xx	xx							
	SD xx									
x	xx	H xx	xx							
		SD xx								
	x	xx	H xx	xx						
			SD xx							
	x	xx	xx	H xx	xxx					
	x	xx	xx	SD xx	xxx					
				x	H xx					
				x	SD xx					
					x	H xx				
						SD xx				
						x	H xx	xx	xx	xx
							SD xx			
Legend:										
	Refer to lane requirement charts									
x	The full width of the traveled way must be open for use by traffic after 0500.									
xx	The full width of the traveled way must be open for use by traffic.									
xxx	The full width of the traveled way must be open for use by traffic until 2400.									
H	Designated holiday									
SD	Special day									

Replace "Reserved" in section 12-4.05B with:

Chart no. 1A																									
Freeway Lane Requirements																									
County: Orange					Route/Direction: Route 91/WB										PM: 0.9/5.4										
Closure limits: Westbound SR-91 from east of State College Boulevard to west of Brookhurst Street																									
From hour to hour																									
	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	2	2
Fridays	1	1	1	1	2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	2
Saturdays	2	1	1	1	1	2	2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	2
Sundays	2	1	1	1	1	1	1	2	2	S	S	S	S	S	S	S	S	S	S	S	S	S	S	2	2

Legend:

1	Provide at least 1 through freeway lane open in direction of travel
2	Provide at least 2 adjacent through freeway lanes open in direction of travel
S	Shoulder closure allowed (right / left)

REMARKS: Chart no. 1A is applicable for construction operations related to pavement delineation, placing/removing temporary rail (Type K).

Replace "Reserved" in section 12-4.05B with:

Chart no. 1B																									
Freeway Lane Requirements																									
County: Orange					Route/Direction: Route 91/EB										PM: 0.9/5.4										
Closure limits: Eastbound SR-91 from Brookhurst Street to Magnolia Avenue																									
From hour to hour																									
	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	3	3	3	3																					3
Fridays	3	3	3	3																					3
Saturdays	3	3	3	3	3	3	3																		3
Sundays	3	3	3	3	3	3	3	3																	3

Legend:

3	Provide at least 3 adjacent through freeway lanes open in direction of travel
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REMARKS: Chart no. 1B is applicable for removal of existing overhead sign structure at Station "A" 105+28 and installation of new overhead sign structure at Station "A" 105+10. Chart no. 1B is also applicable for the removal and construction of 140 linear feet of concrete median barrier, for pavement delineation, and placement/removal of temporary rail (Type K) installation associated with the removal and replacement of overhead sign structure and concrete median barrier.

Replace "Reserved" in section 12-4.05C with:

Chart no. 2																										
Complete Freeway Closure Hours																										
County: Orange					Route/Direction: Route 91/WB										PM: 0.9/5.4											
Closure limits: Westbound SR-91 from Brookhurst Street to Magnolia Avenue																										
From hour to hour		24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays		C	C	C	C																					C
Fridays		C	C	C	C																					C
Saturdays		C	C	C	C	C	C	C																		C
Sundays		C	C	C	C	C	C	C	C																	C
<p>Legend:</p> <p><input type="checkbox"/> C Freeway or expressway may be closed completely</p> <p><input type="checkbox"/> No complete freeway or expressway closure is allowed</p>																										
<p>REMARKS: Chart no. 2 is applicable for removal of existing overhead sign structure at Station "A" 105+28 and installation of new overhead sign structure at Station "A" 105+10. Chart no. 2 is also applicable for the removal and construction of 140 linear feet of concrete median barrier, for pavement delineation, and placement/removal of temporary rail (Type K) installation associated with the removal and replacement of overhead sign structure and concrete median barrier.</p>																										

Replace "Reserved" in section 12-4.05E with:

Chart no. 3																										
Complete Ramp Closure Hours																										
County: Orange					Route/Direction: Route 91/WB										PM: 0.9/5.4											
Closure limits: Westbound Route 91 at: State College Blvd Off-ramp ("SC2" line), Raymond Street Off-ramp ("RA2" line), Brookhurst Street On-ramp ("BH1" line)																										
From hour to hour		24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Fridays		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Saturdays		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sundays		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
<p>Legend:</p> <p><input type="checkbox"/> C Ramp may be closed completely</p>																										
<p>REMARKS: Chart no. 3 is applicable for ramp closures specifically identified within the plans for 9 days or less.</p>																										

Chart no. 4 Ramp Lane Requirements																									
County: Orange					Route/Direction: Route 91/WB										PM: 0.9/5.4										
Closure limits: Westbound Route 91 at: State College Blvd Off-ramp ("SC2" line), Raymond Street Off-ramp ("RA2" line), Brookhurst Street On-ramp ("BH1" line)																									
From hour to hour																									
	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	C	C	C	C	C	S	S	S	S	1	1	1	1	1	S	S	S	S	S	S	S	S	S	S	C
Fridays	C	C	C	C	C	S	S	S	S	1	1	1	1	1	S	S	S	S	S	S	S	S	S	S	C
Saturdays	C	C	C	C	C	C	C	S	S	1	1	1	1	1	S	S	S	S	S	S	S	S	S	S	C
Sundays	C	C	C	C	C	C	C	C	1	1	1	1	1	1	1	1	1	1	1	1	S	S	S	S	C

Legend:

1 Provide at least 1 ramp lane, not less than 11 feet in width, open in direction of travel

C Ramp may be closed completely

S Shoulder closure allowed

REMARKS: Chart no. 4 is applicable for ramp closures related to pavement delineation, placing/removing temporary rail (Type K) installation, plastic pipe installation traversing Ramp "HB1" line and cold plane/overlay operations.

Replace "Reserved" in section 12-4.05F with:

Chart no. 5 Lane Requirements																									
County: Orange					Route/Direction: Brookhurst, Euclid, Raymond/East & Acacia										PM: N/A										
Closure limits: SB & NB Brookhurst at Route 91, SB & NB Euclid at Route 91, SB & NB Raymond/East at Route 91, and SB & NB Acacia at Route 91																									
From hour to hour																									
	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	1	N	N	N	N	1	1	1	1	1	1	N	N	N	N	N	1	1	1	1	1
Fridays	1	1	1	1	1	N	N	N	N	1	1	1	1	1	1	N	N	N	N	N	1	1	1	1	1
Saturdays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sundays	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Legend:

1 Provide at least 1 through traffic lane open in direction of travel

N No work allowed

REMARKS: Chart no. 5 is applicable for construction operations related to bridge abutments and/or median bent.

- The closure starts with the 1st cone down and ends with the last cone picked up.
- Closure signs must not be exposed to public traffic more than 15 minutes before or after a closure, except as otherwise indicated.
- Construction safety zone guidelines will apply at all times.

**Chart no. 6
Lane Requirements**

County: Orange	Route/Direction: State College	PM: N/A																							
Closure limits: SB & NB State College at Route 91																									
From hour to hour	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mondays through Thursdays	1	1	1	1	2	N	N	N	N	2	2	2	2	2	2	N	N	N	N	N	2	2	2	2	
Fridays	1	1	1	1	2	N	N	N	N	2	2	2	2	2	2	N	N	N	N	N	2	2	2	2	
Saturdays	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Sundays	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	

Legend:

- | |
|---|
| 1 |
|---|

 Provide at least 1 through traffic lane open in direction of travel
- | |
|---|
| 2 |
|---|

 Provide at least 2 adjacent through traffic lanes open in direction of travel
- | |
|---|
| N |
|---|

 No work allowed

REMARKS: Chart no. 6 is applicable for construction operations related to bridge abutments and/or median bent.

1. The closure starts with the 1st cone down and ends with the last cone picked up.
2. Closure signs must not be exposed to public traffic more than 15 minutes before or after a closure, except as otherwise indicated.
3. Construction safety zone guidelines will apply at all times.

Replace "Reserved" in section 12-4.05G with:

Chart no. 7 Complete Local Street Closure Hours																											
County: Orange					Route/Direction: Brookhurst, Euclid, Raymond/East, Acacia & State College										PM: N/A												
Closure limits: NB & SB Brookhurst at Route 91 NB & SB Euclid at Route 91 NB & SB Raymond/East at Route 91 NB & SB Acacia at Route 91 NB & SB State College at Route 91																											
From hour to hour																											
	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Mondays through Thursdays	C	C	C	C	C																			C	C	C	
Fridays	C	C	C	C	C																				C	C	C
Saturdays	C	C	C	C	C																				C	C	C
Sundays	C	C	C	C	C																				C	C	C
Legend:																											
<input type="checkbox"/> C Conventional highway may be closed completely <input type="checkbox"/> No complete conventional highway closure is allowed																											
REMARKS: Chart no. 7 is applicable for bridge removal (portion), girder erection, placement of temporary rail (Type K) & pavement delineation.																											

Replace section 12-5 with:

12-5 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

12-5.01 GENERAL

Section 12-5 includes specifications for closing traffic lanes, ramps, or a combination, with stationary lane closures on multilane highways. The traffic control system for a lane closure or a ramp closure must comply with the details shown.

Traffic control system includes signs.

12-5.02 MATERIALS

Not Used

12-5.03 CONSTRUCTION

Each vehicle used to place, maintain, and remove components of a traffic control system on a multilane highway must be equipped with a Type II flashing arrow sign that must be in operation whenever the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II flashing arrow sign not involved in placing, maintaining, or removing the components if operated within a stationary-type lane closure must display only the caution display mode. The sign must be controllable by the operator of the vehicle while the vehicle is in motion. If a flashing arrow sign is required for a lane closure, the flashing arrow sign must be operational before the lane closure is in place.

Whenever components of the traffic control system are displaced or cease to operate or function as specified from any cause, immediately repair the components to the original condition or replace the components and restore the components to the original location.

For a stationary lane closure, ramp closure, or a combination, made only for the work period, remove the components of the traffic control system from the traveled way and shoulder, except for portable delineators placed along open trenches or excavation adjacent to the traveled way at the end of each

work period. You may store the components at selected central locations designated by the Engineer within the limits of the highway.

12-5.04 PAYMENT

Traffic control system for lane closure is paid for as traffic control system.

The requirements in section 4-1.05 for payment adjustment do not apply to traffic control system. Adjustments in compensation for traffic control system will be made for an increase or decrease in traffic control work if ordered and will be made on the basis of the cost of the necessary increased or decreased traffic control. The adjustment will be made on a force account basis for increased work and estimated on the same basis in the case of decreased work.

A traffic control system required by change order work is paid for as a part of the change order work.

Replace section 12-8 with:

12-8 TEMPORARY PAVEMENT DELINEATION

12-8.01 GENERAL

Section 12-8 includes specifications for placing, applying, maintaining, and removing temporary pavement delineation.

Temporary signing for no-passing zones must comply with section 12-3.06.

Temporary painted traffic stripes and painted pavement markings used for temporary delineation must comply with section 84-3.

12-8.02 MATERIALS

12-8.02A General

Not Used

12-8.02B Temporary Lane Line and Centerline Delineation

Temporary pavement markers must be the same color as the lane line or centerline markers being replaced. Temporary pavement markers must be permanent pavement markers on the Authorized Material List. Place temporary pavement markers under the manufacturer's instructions.

12-8.02C Temporary Edge Line Delineation

On multilane roadways, freeways, and expressways open to traffic where edge lines are obliterated and temporary pavement delineation to replace those edge lines is not shown, provide temporary pavement delineation for:

1. Right edge lines consisting of (1) a solid 4-inch wide traffic stripe of the same color as the stripe being replaced, (2) traffic cones, or (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet
2. Left edge lines consisting of (1) solid 4-inch wide traffic stripe of the same color as the stripe being replaced, (2) traffic cones, (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet, or (4) temporary pavement markers placed longitudinally at intervals not exceeding 6 feet

12-8.02D Temporary Traffic Stripe Tape

Not Used

12-8.02E Temporary Traffic Stripe Paint

Not Used

12-8.02F Temporary Pavement Marking Tape

Not Used

12-8.02G Temporary Pavement Marking Paint

Not Used

12- 8.02H Temporary Pavement Markers

Temporary pavement markers must be 1 of the permanent pavement markers on the Authorized Material List.

12-8.03 CONSTRUCTION

12-8.03A General

Wherever work activities obliterate pavement delineation, place temporary or permanent pavement delineation before opening the traveled way to traffic. Place lane line and centerline pavement delineation for traveled ways open to traffic. On multilane roadways, freeways and expressways, place edge line delineation for traveled ways open to traffic.

Establish the alignment for the temporary pavement delineation including required lines or markers. Surfaces to receive an application of paint must be dry and free of dirt and loose material. Do not apply temporary pavement delineation over existing pavement delineation or other temporary pavement delineation. Maintain temporary pavement delineation until it is superseded or you replace it with a new pattern of temporary pavement delineation or permanent pavement delineation. Temporary pavement delineation must be repainted (2 coats) every 180 days.

When the Engineer determines the temporary pavement delineation is no longer required for the direction of traffic, remove the temporary pavement markers and underlying adhesive from the final layer of surfacing and from the existing pavement to remain in place. Remove temporary pavement delineation that conflicts with any subsequent or new traffic pattern for the area.

12-8.03B Temporary Lane line and Centerline Delineation

Whenever lane lines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown, the minimum lane line and centerline delineation must consist of temporary pavement markers placed longitudinally at intervals not exceeding 24 feet. For temporary pavement markers on the Authorized Material List for long-term day/night use, 180 days or less, cement the markers to the surfacing with the adhesive recommended by the manufacturer except do not use epoxy adhesive to place the pavement markers in areas where removal of the markers will be required.

For temporary lane line or centerline delineation consisting entirely of temporary pavement markers on the Authorized Material List for short-term day/night use, 14 days or less, place the markers longitudinally at intervals not exceeding 24 feet. Do not use the markers for more than 14 days on lanes opened to traffic. Place the permanent pavement delineation before the end of the 14 days. If the permanent pavement delineation is not placed within the 14 days, replace the temporary pavement markers with additional temporary pavement delineation equivalent to the pattern specified or shown for the permanent pavement delineation for the area. The Department does not pay for the additional temporary pavement delineation.

12-8.03C Temporary Edge Line Delineation

You may apply temporary painted traffic stripe where removal of a 4-inch wide traffic stripe is not required.

The Engineer determines the lateral offset for traffic cones, portable delineators, and channelizers used for temporary edge line delineation. If traffic cones or portable delineators are used for temporary pavement delineation for edge lines, maintain the cones or delineators during hours of the day when the cones or delineators are being used for temporary edge line delineation.

Channelizers used for temporary edge line delineation must be an orange surface-mounted type. Cement channelizer bases to the pavement under section 85 for cementing pavement markers to pavement except do not use epoxy adhesive to place channelizers on the top layer of the pavement. Channelizers must be 1 of the 36-inch, surface-mounted types on the Authorized Material List.

Remove the temporary edge line delineation when the Engineer determines it is no longer required for the direction of traffic.

12-8.03D Temporary Traffic Stripe Tape

Not Used

14-7.03C Construction

14-7.03C(1) General

Within the boundaries of the project area, no construction or related activities, which may involve subsurface disturbance, are permitted without authorization.

Notify the Engineer 20 days before start of subsurface disturbing activities.

The Paleontological Salvage Team will monitor and salvage appropriate fossil specimens identified during excavation. The Engineer may temporarily divert or stop construction operations in the vicinity of a paleontological find or notify you of the need to avoid disturbing an area pending removal of fossil specimens.

14-7.03D Payment

Any additional excavation required due to discovery of paleontological remains is change order work.

Replace the 1st paragraph of section 14-8.02 with:

Do not exceed 86 dBA LMax at 50 feet from the job site activities from 9 p.m. to 6 a.m. except you may perform the following activities during the hours and for the days shown in the following table:

Noise Restriction Exceptions

Activity	Hours		Days	
	From	To	From	Through
Bridge removal	9:00pm	5:00am	Friday	Sunday
Precast girder erection	9:00pm	5:00am	Friday	Sunday
Steel girder erection	9:00pm	5:00am	Friday	Sunday
Ground anchor installation (Brookhurst)	9:00pm	5:00am	Friday	Sunday
Pavement demolition & replacement with rapid strength concrete Sta "A" 106+56.99 to 131+66.88 Sta "A" 158+10.00 to 183+70.00 Sta "A" 267+00.00 to 288+81.89 Sta "B" 320+00.00 to 324+97.69	9:00pm	5:00am	Friday	Sunday

Add to section 14-8.02:

Provide one Type 1 sound level meter and 1 acoustic calibrator to be used by the Department until Contract acceptance. Provide training by a person trained in noise monitoring to 1 Department employee designated by the Engineer. The sound level meter must be calibrated and certified by the manufacturer or other independent acoustical laboratory before delivery to the Department. Provide annual recalibration by the manufacturer or other independent acoustical laboratory. The sound level meter must be capable of taking measurements using the A-weighting network and the slow response settings. The measurement microphone must be fitted with a windscreen. The Department returns the equipment to you at Contract acceptance. Work specified in this paragraph is paid for as noise monitoring.

Replace section 14-11.08 with:

14-11.08 DISTURBANCE OF EXISTING PAINT SYSTEMS ON BRIDGES

14-11.08A General

14-11.08A(1) Summary

Section 14-11.08 includes specifications for disturbing existing paint systems.

The existing paint system on bridge numbers 55-0216 and 55-0218 consists of red lead primer paint. Any work that disturbs the existing paint system will expose workers to health hazards and will:

1. Produce debris containing heavy metal in amounts that exceed the thresholds established in 8 CA Code of Regs and 22 CA Code of Regs.
2. Produce toxic fumes when heated.

The grime and debris on the bridge may also contain lead. Consider the grime and debris part of the paint system. The Department is the hazardous waste generator if the Engineer accepts waste characterization analytical test results documenting that the debris is a hazardous waste.

14-11.08A(2) Submittals

14-11.08A(2)(a) Debris Containment and Collection Plan

Submit a debris containment and collection plan. The plan must:

1. Identify materials
2. Identify equipment and methods to be used when the existing paint system is disturbed
3. Include shop drawings of:
 - 3.1. Containment systems
 - 3.2. Loads applied to the bridge by the containment structure
 - 3.3. Components that provide ventilation, air movement, and visibility for worker safety.
4. Identify the analytical laboratory that will perform the analyses
5. Include current DTSC registration certificate and documentation of compliance with the CA Highway Patrol Biennial Inspection of Terminals Program of the hazardous waste hauler that will transport the hazardous waste
6. Identify the disposal site that will accept the hazardous waste debris

14-11.08A(2)(b) Lead Compliance Plan

Submit a lead compliance plan under 7-1.02K(6)(j)(ii).

14-11.08A(2)(c) Analytical Test Results

Submit analytical test results of the debris, including chain of custody documentation, for review and acceptance before:

1. Requesting the Engineer's signature on the waste profile requested by the disposal facility
2. Requesting the Engineer obtain an US EPA Generator Identification Number for disposal
3. Removing the residue from the site

14-11.08A(2)(d) U.S. Environmental Protection Agency Identification Number Request

Submit a request for the US EPA Generator Identification Number when the Engineer accepts waste characterization analytical test results documenting that the debris is a hazardous waste.

14-11.08A(2)(e) Disposal Documentation

Submit receiving landfill or recycling facility documentation of proper disposal within 5 business days of transporting debris from the project.

14-11.08A(3) Safety and Health Provisions

Comply with 8 CA Code of Regs, including § 1532.1.

14-11.08A(3)(a) Protective Work Clothing and Washing Facilities

Wherever exposure or possible exposure to heavy metals or silica dust exists, and during application of undercoats of paint, supply clean protective work clothing for 5 Department personnel. Replace as needed.

Protective work clothing and washing facilities will be inspected by the Engineer and must meet approval for use by Department personnel before starting any activity with potential for lead exposure.

The protective work clothing will remain your property at the completion of the Contract.

14-11.08A(3)(b) Air Monitoring

Perform work area monitoring of the ambient air in and around the work area at the bridge site to verify the effectiveness of the containment system. The work area monitoring includes:

1. Collecting, analyzing and reporting air test results
2. Recommending corrective action when specified exposure levels are exceeded.

The work area monitoring must be performed under the direction of a CIH. Collect samples at locations designated by the Engineer.

Air samples for lead detection must be collected and analyzed under National Institute of Occupational Safety and Health (NIOSH) method 7082, with a limit of detection of at least $0.05 \mu\text{g}/\text{m}^3$. Air samples for detection of other metals must be collected and analyzed under NIOSH method 7300, with a detection limit of at least 1 percent of the appropriate permissible exposure limits (PELs) specified by Cal/OSHA. Alternative methods of sample collection and analysis with equivalent limits of detection may be used.

The airborne metals exposure, outside either the containment system or work areas must not exceed the lower of:

1. An average of $1.5 \mu\text{g}/\text{m}^3$ of air per day and $0.15 \mu\text{g}/\text{m}^3$ per day on a rolling 90-day basis. Calculate average daily concentrations based on monitoring to date, and projection based on those monitoring trends for the next 90 days or to the end of work subject to the lead compliance plan if less than the specified averaging period
2. 10 percent of the action level specified for lead by 8 CA Code of Regs §1532.1
3. 10 percent of the appropriate PELs specified for other metals by Cal/OSHA

Collect air samples daily during work that disturbs the existing paint system. All air samples must be analyzed within 48 hours by a facility accredited by the Environmental Lead Laboratory-Accreditation Program of the American Industrial Hygiene Association. If airborne metals concentrations exceed the allowable levels modify the work or containment system to prevent further release of metals. When corrective action is recommended by the CIH, additional samples must be taken unless directed otherwise.

Air sample laboratory analysis results, including results of additional samples taken after corrective action must be prepared by the CIH and must be delivered:

1. Verbally within 48 hours after sampling
2. As an informational submittal within 5 days after sampling.

Air sample laboratory analysis results must include:

1. Date and location of sample collection, sample number, Contract number, bridge number, full name of the structure as shown, and District-County-Route-Post mile
2. Name and address of the certified laboratory that performed the analyses
3. Chain of custody forms
4. List of emission control measures in place when air samples were taken
5. Air sample results compared to the appropriate PELs
6. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits
7. Signature of the CIH who reviewed the data and made recommendations

14-11.08A(4) Quality Control and Assurance

Handle, store, transport and dispose of debris produced when the existing paint system is disturbed under all applicable Federal, State, and local hazardous waste laws. Laws that govern this work include:

1. Health & Safety Code, Div 20, Chp 6.5 (California Hazardous Waste Control Act).
2. 22 CA Code of Regs, Div 4.5, (Environmental Health Standards for the Management of Hazardous Waste).
3. 8 CA Code of Regs.

14-11.08B Materials

Not Used

14-11.08C Construction

14-11.08C(1) General

Contain all debris produced when the existing paint system is disturbed.

14-11.08C(2) Containment System

Use a Class I SSPC containment system. The containment system must contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

The containment system must provide the clearances specified in section 12-4, except if no clearances are specified a vertical clearance of 15 feet and a horizontal clearance of 32 feet must be provided for the passage of public traffic.

Falsework or supports for the ventilated containment structure must not extend below the vertical clearance level nor to the ground line at locations within the roadbed.

The containment system must provide the minimum clearances as required in section 5-1.20C for the passage of railroad traffic.

The ventilated containment structure must comply with the requirements for falsework as specified in section 48-2.

The minimum total design load of the ventilated containment structure must consist of the sum of the dead and live vertical loads. Dead load consists of the actual load of the ventilated containment structure. Live loads consist of a uniform load of not less than 45 psf, including 20 psf of sand load applied over the supported area, and a moving concentrated load of 1,000 pounds to produce maximum stress in the main supporting elements. Assumed horizontal loads need not be included in the design of the ventilated containment structure.

If flexible framing is used, support and fasten it to prevent escape of abrasive and blast materials due to whipping from traffic or wind and to maintain clearances.

The ventilation system in the ventilated containment structure must be of the forced input airflow type with fans or blowers.

Negative air pressure must be employed within the ventilated containment structure and will be verified by visual methods by observing the concave nature of the containment materials while taking into account wind effects or by using smoke or other visible means to observe airflow. The input airflow must be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust airflow of the ventilation system in the ventilated containment structure must be forced into wet or dry dust collectors or bag houses.

Properly maintain the ventilated containment structure while work is in progress and do not change the approved containment structure unless authorized.

14-11.08C(3) Debris Containment Verification

Collect 4 soil samples before starting work and collect 4 soil samples within 36 hours after completion of cleaning operations of existing steel. The Engineer will designate the sample locations. A soil sample consists of 5 plugs, each 3/4 inch in diameter and 1/2 inch deep, taken at each corner and center of a 1 sq yd area. Analyze soil samples for:

1. Total lead by US EPA Method 6010B or US EPA Method 7000 Series
2. Soluble lead by California Waste Extraction Test (Ca WET)

The analytical laboratory performing the analyses must be certified by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) for all analyses to be performed.

The concentrations of heavy metals in the soil in the area affected must not increase when the existing paint system is disturbed. If soil sampling, after completion of work that disturbs the existing paint system,

shows an increase in the concentrations of heavy metals, the area affected must be cleaned and resampled until soil sampling and testing shows concentrations of heavy metals less than or equal to the concentrations collected before the start of work.

In areas without exposed soil, the concentrations of heavy metals on the area affected must not increase when the existing paint system is disturbed. Any visible increase in the concentrations of heavy metals, after completion of work that disturbs the existing paint system, must be removed.

Soil sample laboratory analysis results, including results of additional samples taken after corrective action, must be delivered:

1. Verbally within 48 hours after sampling
2. Within 5 days after sampling

Soil sample laboratory analysis results must include:

1. Date and location of sample collection, sample number, Contract number, bridge number, full name of the structure as shown, and District-County-Route-Post mile
2. Concentrations of heavy metals expressed as mg/kg and mg/L.
3. Name and address of the certified laboratory that performed the analyses
4. Chain of custody documentation

If containment measures are inadequate to contain and collect debris produced when the existing paint system is disturbed, the Engineer will direct you to revise the operations and the debris containment and collection plan. The directions will be in writing and will specify the items of work for which your debris containment and collection plan is inadequate. No further work must be performed on the items until:

1. The debris containment and collection plan is adequate
2. If required, a revised plan has been authorized for the containment and collection of debris produced when the existing paint system is disturbed.
3. Released material has been cleaned up and contained

14-11.08C(4) Debris Storage

Debris produced when the existing paint system is disturbed must not be temporarily stored on the ground. Debris accumulated inside the containment system must be removed before the end of each work shift. Debris must be stored as a hazardous waste.

14-11.08C(5) Debris Waste Characterization

Make necessary arrangements to test the debris as required by the disposal facility and as specified. Testing must include:

1. Total lead by US EPA Method 6010B
2. Soluble lead by Ca WET
3. Soluble lead by Toxicity Characteristic Leaching Procedure (TCLP)

From the first 220 gal of hazardous waste or portion thereof if less than 220 gal of hazardous waste are produced, a minimum of 4 randomly selected samples must be taken and analyzed individually. Samples must not be composited. From each additional 880 gal of hazardous waste or portion thereof if less than 880 gal are produced, a minimum of 1 additional random sample must be taken and analyzed. Use chain of custody procedures consistent with chapter 9 of U.S. EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) while transporting samples from the project to the laboratory. Each sample must be homogenized before analysis by the laboratory performing the analyses. A sample aliquot sufficient to cover the amount necessary for the total and the soluble analyses must then be taken. This aliquot must be homogenized a 2nd time and the total and soluble analyses run on this aliquot. The homogenization process must not include grinding of the samples. Submit the name and location of the disposal facility that will be accepting the hazardous waste and the analytical laboratory along with the testing requirements not less than 5 business days before the start of work that disturbs the existing paint system. The analytical laboratory must be certified by the CDPH ELAP for all analyses to be performed.

14-11.08C(6) Debris Transporting and Disposal

For bidding purposes assume the debris is a hazardous waste.

After the Engineer accepts the waste characterization analytical test results, dispose of hazardous waste debris at a Class 1 disposal facility located in California under the requirements of the disposal facility operator within 30 days after accumulating 220 pounds of residue and dust. The Department is the generator of this hazardous waste.

If less than 220 pounds of hazardous waste debris is generated in total, dispose of it within 30 days after the start of accumulation of the debris.

Use a hazardous waste manifest and a transporter using vehicles with current DTSC registration certificate when transporting hazardous waste. The Engineer will obtain the US EPA Generator Identification Number and will sign all manifests as the generator within 2 business days of receiving and accepting the waste characterization analytical test results and receiving your request for the US EPA Generator Identification Number.

Dispose of the debris at an appropriately permitted disposal facility based upon the waste characterization and comply with disposal facility requirements. Make all arrangements with the operator of the disposal facility. Transport debris as a hazardous waste unless analytical testing demonstrates that it is non-hazardous and the Engineer agrees.

If analytical test results demonstrate that the residue is a non-hazardous waste and the Engineer agrees, dispose of the residue at an appropriately permitted CA Class II or CA Class III facility or recycle it.

Debris may be disposed of at a facility equipped to recycle the debris, subject to the following requirements:

1. Copper slag abrasive blended by the supplier with a calcium silicate compound must be used for blast cleaning.
2. The debris may be transported to the recycling facility as a non-hazardous waste.
3. Make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

14-11.08D Payment

Payment for a lead compliance plan is not included in the payment for environmental stewardship work.

If analytical test results demonstrate that the debris is a non-hazardous waste, the Engineer agrees, and debris is disposed of at an appropriately permitted CA Class II, CA Class III, or recycling facility, the Department does not adjust payment.

Replace section 14-11.09 with:

14-11.09 TREATED WOOD WASTE

14-11.09A General

14-11.09A(1) Summary

Section 14-11.09 includes specifications for handling, storing, transporting, and disposing of treated wood waste (TWW).

Wood removed from metal beam guard railing, portion of power pole, wood frame and roadside signs is TWW. Manage TWW under 22 CA Code of Regs, Div. 4.5, Chp. 34.

14-11.09A(2) Submittals

For disposal of TWW, submit as an informational submittal a copy of each completed shipping record and weight receipt within 5 business days.

14-11.09B Materials

Not Used

14-11.09C Construction

14-11.09C(1) General

14-11.09C(2) Training

Provide training to personnel who handle TWW or may come in contact with TWW. Training must include:

1. All applicable requirements of 8 CA Code of Regs
2. Procedures for identifying and segregating TWW
3. Safe handling practices
4. Requirements of 22 CA Code of Regs, Div. 4.5, Chp. 34
5. Proper disposal methods

Maintain records of personnel training for 3 years.

14-11.09C(3) Storage

Store TWW before disposal using the following methods:

1. Elevate on blocks above a foreseeable run-on elevation and protect from precipitation for no more than 90 days.
2. Place on a containment surface or pad protected from run-on and precipitation for no more than 180 days.
3. Place in water-resistant containers designed for shipping or solid waste collection for no more than 1 year.
4. Place in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C).

Prevent unauthorized access to TWW using a secured enclosure such as a locked chain link fenced area or a lockable shipping container located within the job site.

Resize and segregate TWW at a location where debris from the operation including sawdust and chips can be contained. Collect and manage the debris as TWW.

Provide water-resistant labels that comply with 22 CA Code of Regs, Div. 4.5, Chp. 34, §67386.5, to clearly mark and identify TWW and accumulation areas. Labels must include:

1. Caltrans, District number, Construction, Construction Contract number
2. District office address
3. Engineer's name, address, and telephone number
4. Contractor's contact name, address and telephone number
5. Date placed in storage

14-11.09C(4) Transporting and Disposal

Before transporting TWW, obtain an agreement from the receiving facility that the TWW will be accepted. Protect shipments of TWW from loss and exposure to precipitation. For projects with 10,000 pounds or more of TWW, request a US EPA Generator Identification Number from the Engineer at least 5 business days before the first shipment. Each shipment must be accompanied by a shipping record such as a bill of lading or invoice that includes:

1. Caltrans with district number
2. Construction Contract number
3. District office address
4. Engineer's name, address, and telephone number
5. Contractor's contact name and telephone number
6. Receiving facility name and address
7. Waste description: Treated Wood Waste with preservative type if known or unknown/mixture
8. Project location
9. Estimated quantity of shipment by weight or volume
10. Date of transport
11. Date of receipt by the receiving TWW facility
12. Weight of shipment as measured by the receiving TWW facility
13. For projects with 10,000 pounds or more of TWW include the USA EPA Generator Identification Number.

If you do not complete HMA placement before opening the area to traffic, you must:

1. Construct a temporary HMA taper to the level of the existing pavement
2. Place HMA during the next work shift
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the Engineer approves the corrective action plan.

15-2.02B(3)(b) Materials

Use the same quality of HMA for temporary tapers that is used for the HMA overlay or comply with the specifications for minor HMA in section 39.

15-2.02B(3)(c) Construction

15-2.02B(3)(c)(i) General

Do not use a heating device to soften the pavement.

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width. If the cutter head width is wider than the cold plane area shown, submit a request for using a wider cutter head. Do not cold plane unless the Engineer approves your request.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
 - 2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
 - 2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
3. Equipped to effectively control dust generated by the planing operation
4. Operated so that no fumes or smoke is produced.

Replace broken, missing, or worn machine teeth.

15-2.02B(3)(c)(ii) Grade Control and Surface Smoothness

Furnish, install, and maintain grade and transverse slope references.

The depth, length, width, and shape of the cut must be as shown or as ordered. The final cut must result in a neat and uniform surface. Do not damage the remaining surface.

The completed surface of the planed asphalt concrete pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

15-2.02B(3)(c)(iii) Temporary HMA Tapers

If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper. The HMA temporary taper must be:

1. Placed to the level of the existing pavement and tapered on a slope of 30:1 (horizontal:vertical) or flatter to the level of the planed area
2. Compacted by any method that will produce a smooth riding surface

Completely remove temporary tapers before placing permanent surfacing.

15-2.02B(3)(c)(iv) Remove Planed Material

Remove cold planed material concurrent with planing activities so that removal does not lag more than 50 feet behind the planer.

15-2.02B(3)(d) Payment

Payment for removal of pavement markers, thermoplastic traffic stripe, painted traffic stripe, and pavement marking within the area of cold planing is included in the payment for cold plane asphalt concrete pavement of the types shown in the Bid Item List.

Replace section 15-2.02C(2) with:

15-2.02C(2) Remove Traffic Stripes and Pavement Markings Containing Lead

Residue from removing traffic stripes and pavement markings contains lead from the paint or thermoplastic. The average lead concentrations are less than 1,000 mg/kg total lead and 5 mg/L soluble lead. This residue:

1. Is a nonhazardous waste
2. Does not contain heavy metals in concentrations that exceed thresholds established by the Health and Safety Code and 22 CA Code of Regs
3. Is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

Submit a lead compliance plan under section 7-1.02K(6)(j)(ii).

Payment for a lead compliance plan is not included in the payment for existing facilities work.

Payment for handling, removal, and disposal of pavement residue that is a nonhazardous waste is included in the payment for the type of removal work involved.

Replace section 15-2.0I with:

15-2.02I Remove Sign Structures

Removing overhead sign structures includes removal of:

1. Frames, braces, supports, and brackets
2. Portions of foundations
3. Sign panels
4. Mounting hardware for light fixtures
5. Walkways, safety railing, gutter
6. Electrical equipment for sign lighting
7. Hardware
8. Posts
9. Portions of foundations

Concrete foundations may be abandoned in place except that the top portion, including anchor bolts, reinforcing steel, and conduits, must be removed to a depth of not less than 3 feet below the adjacent finished grade. The resulting holes must be backfilled and compacted with material that is equivalent to the surrounding material.

Removing bridge mounted sign structures includes removal of:

1. Frames, braces, supports, and brackets
2. Portions of foundations
3. Sign panels
4. Mounting hardware for light fixtures
5. Walkways, safety railing, and gutter
6. Electrical equipment for sign lighting
7. Hardware

Remove signs' conduit and wiring to the nearest pull box. Remove fuses within spliced connections in the pull box.

Replace section 15-2.02M with:

15-2.02M Remove Bridge Mounted Sign Panel

Removal of bridge mounted sign panels includes the removal of bridge mounted sign panels affixed directly to bridge girders and soffit faces and all hardware.

Existing bridge mounted sign panels must not be removed until replacement bridge mounted sign panels or other roadside signs, have been installed or until the existing bridge mounted sign panels are no longer required for the direction of public traffic.

Replace section 15-2.02N with:

15-2.02N Temporary Construction Easement Demolition Removal Locations

15-2.02N(1) General

Section 15-202N includes specifications for all removals within temporary construction easements which are not shown or otherwise covered elsewhere, as shown in the table below and necessary to complete the adjacent highway improvements.

Before making removals, you will meet with the Engineer to verify the limits of removals.

Parcel no. (*)	TCE demolition removal location	Appraisal map	Items to be removed	Advance notice to Engineer (days)
102719-1	1	E120087-02	<ul style="list-style-type: none"> • Approximately 460 sqft of grass and irrigation • Approximately 60 ft of concrete block wall (6 ft high) • Approximately 5 ft of concrete block wall (located between residential properties to the east) • Approximately 10 ft concrete curb near the southwestern corner of parcel 	20
102720-1	2	E120087-02	<ul style="list-style-type: none"> • Approximately 350 sqft of grass and irrigation • Approximately 70 ft of concrete block wall with wooden fence (7 ft high) • Approximately 5 ft of concrete block wall (located between residential properties to east and west) 	20
102721-1	3	E120087-02	<ul style="list-style-type: none"> • Approximately 350 sqft of grass and irrigation • Approximately 70 ft of concrete block wall (6 ft high) • Approximately 5 ft of concrete block wall (located between residential properties to east and west) • Approximately 4 ft of wooden fence (3 ft high) • Miscellaneous plants 	20
102722-1	4	E120087-02	<ul style="list-style-type: none"> • Approximately 230 sqft of grass and irrigation • 10 by 10 ft metal shed • Approximately 120 sqft of concrete pavement • Approximately 70 ft of concrete block wall (6 ft high) • Approximately 5 ft of concrete block wall (located between residential properties to the west) 	20
102753-1	5	E120087-05	<ul style="list-style-type: none"> • Approximately 7,000 sqft of landscaping • Approximately 750 ft of wrought iron fence • 7 trees • Thirty 24-in box trees • Miscellaneous plants 	20

Parcel no. (*)	TCE demolition removal location	Appraisal map	Items to be removed	Advance notice to Engineer (days)
102754-2	6	E120087-07	<ul style="list-style-type: none"> • Approximately 210 sqft of grass and irrigation • Approximately 70 ft of concrete block wall (6.5 ft high) • Approximately 200 ft of concrete block wall (10 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the east) • Approximately 520 sqft of concrete pavement • 1 wood gate (6.5 ft high) • Bamboo plants 	20
102755-2	7	E120087-07	<ul style="list-style-type: none"> • Approximately 560 sqft of grass and irrigation • Approximately 60 ft of wooden fence (6 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the east and west) • 17 trees • Bamboo plants 	20
102756-2	8	E120087-07	<ul style="list-style-type: none"> • Approximately 550 sqft of grass and irrigation • Approximately 60 ft of wooden fence (6.5 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the east and west) • 1 tree • Bamboo plants • Miscellaneous plants 	20
102757-2	9	E120087-07	<ul style="list-style-type: none"> • Approximately 510 sqft of grass and irrigation • Approximately 60 ft of wooden fence (6 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the east and west) 	20
102758-3	10	E120087-07	<ul style="list-style-type: none"> • 10 by 5 ft metal shed • Approximately 80 ft of concrete block wall with stucco • Approximately 10 ft of concrete block wall (located between residential properties to the east and west) • 2 trees • Miscellaneous plants 	20

Parcel no. (*)	TCE demolition removal location	Appraisal map	Items to be removed	Advance notice to Engineer (days)
102759-3	11	E120087-07	<ul style="list-style-type: none"> • Approximately 600 sqft of concrete pavement • 24 by 12 ft shed cover • Approximately 80 ft of concrete block wall with stucco • Approximately 10 ft of concrete block wall (located between residential properties to the east and west) • Approximately 12 ft of wrought iron fence • 2 trees 	30
102760-2	12	E120087-07	<ul style="list-style-type: none"> • 9 by 9 ft metal shed • Approximately 80 ft of wrought iron fence (5 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the east) • 7 trees • Miscellaneous plants 	20
102761-1	13	E120087-07	<ul style="list-style-type: none"> • Approximately 900 sqft of grass and miscellaneous landscaping • 9 by 9 ft metal shed • Approximately 70 ft of chain link fence (5 ft high on top of 2 ft high concrete block wall) • Approximately 20 ft of concrete block wall (4 ft high) • Approximately 20 ft of concrete block wall (2 ft high) • Approximately 10 ft of concrete block wall (located between residential properties to the west) • 1 plywood storage shed • Four 5-ft high metal posts 	20
102764-2	14	E120087-08	<ul style="list-style-type: none"> • Approximately 520 sqft of asphalt paving • Approximately 3 ft of concrete block wall (located between residential properties to the east) 	20
102765-1	15	E120087-08	<ul style="list-style-type: none"> • Approximately 490 sqft of asphalt paving • Approximately 3 ft of concrete block wall (located between residential properties to the west) 	20

(*) For accurate right of way data, contact right of way engineering at the District office.

Work within TCEs is limited to the hours of 8AM to 5PM.

All debris from pruning or removing a tree will be cleaned up and hauled away from the job site on the same day that the tree is cut or pruned.

All holes created from removal of features such as, but not limited to, tree surface roots, root balls and stumps, concrete slabs, walls, and fencing, will be backfilled with Class 'A' topsoil and graded to finish level by the end of the workday.

Sprinkler systems, including sprinkler valves, disrupted by construction activities must be capped or restored by the end of the workday.

For Parcel No. 102759-3, you must provide 30 days notice and request that the concrete swimming pool be drained, before any use of the TCE. Upon entering the TCE, you will have 60 days to complete the work within the TCE for removal items listed in the table above and adjacent highway improvements.

You must also provide 20 days notice before any work to be performed for removals within the TCEs and erection of temporary chain link fencing for all parcels with a TCE.

The use of the TCE must not extend beyond the completion of the work within the TCE or easement expiration, whichever is earlier.

Should the actual use of the TCE extend beyond the prescribed period of time, you must notify the Engineer in writing 20 working days before the expiration of the TCE. You will bear all costs incurred by the State for extension of the TCE.

When use of the TCE is no longer required, you must clean all debris, repair any damage to the property caused by your operations and leave the property in a neat, clean, and presentable condition. Damage that impedes the safe access or use of the concrete swimming pool within Parcel No. 102759-3 must be repaired within 72 hours of the damage occurring.

15-2.02N(2) Payment

Payment for cooperating and coordinating with the property owners; providing notices to property owners and working within the temporary construction easements, including the repair of any damage to the property caused by your operations, is included in the payment for each temporary construction easement demolition removal location.

Replace section 15-2.03A(2)(b) with:

15-2.03A(2)(b) Department Salvage Location

A minimum of 2 business days before hauling salvaged material to the Department salvage storage location, notify:

1. Engineer
2. District Recycle coordinator at telephone number (949) 936-0142.

For salvaging closed circuit television (CCTV) equipment, CCTV poles, and changeable message sign equipment, the Department salvage storage location is:

6685 Marine Way, Irvine, CA, 92618.

You must provide the equipment and staff to safely unload and stockpile CCTV equipment and poles.

You must provide lifting equipment and appurtenances to unload the changeable message sign panel, controller cabinet and harness from delivery truck.

When delivering the salvaged equipment, you must prepare an inventory list with description, model number, serial number, and quantity, and obtain dated signature to whom the equipment are delivered to. The signed inventory list must be kept as part of the construction records. A copy must be sent to Caltrans District 12 Electrical Systems.

Replace section 15-2.05C with:

15-2.05C Abandon Culverts and Pipelines

15-2.05C(1) General

Abandon culverts or pipelines by removing portions of the culverts or pipelines, filling the inside, and backfilling the depressions and trenches to grade. As an alternative to abandoning a culvert or pipeline, you may remove the culvert or pipeline, dispose of it, and backfill.

Notify the Engineer before abandoning a culvert or pipeline.

15-2.05C(2) Materials

Openings into existing structures that are to remain in place must be plugged with minor concrete under section 90.

15-2.05C(3) Construction

Wherever culverts or pipelines intersect side slopes, remove them to a depth of at least 3 feet. Measure the depth normal to the plane of the finished side slope. Abandon the remaining portion of the culvert or pipeline.

Culverts or pipelines that are 12 inches or more in diameter must be completely filled by authorized methods. Backfill with sand that is clean, free draining, and free from roots and other deleterious substances. As an alternative to sand, you may backfill with 1 of the following:

1. Controlled low-strength material under section 19-3.02F
2. Slurry cement backfill under section 19-3.02D

Ends of culverts and pipelines must be securely closed by a 6-inch-thick, tight-fitting plug or wall of commercial-quality concrete.

15-2.05C(4) Payment

If backfilling inside the culvert or pipeline is required, payment for backfilling inside the culvert or pipeline is paid for as sand backfill. Payment for backfilling outside the culvert or pipeline is included in the payment for abandon culvert or abandon pipeline.

Delete the 6th paragraph in section 15-3.01.

Add to section 15-3.01:

Remove sound wall includes removing masonry block wall, concrete barrier supports, pile cap, grade beams, and portions of pile footings. Remove sound wall does not include removing concrete barrier on bridges.

Add to section 15-3.01:

Remove rock blanket includes the removal of rock, mortar, portland cement concrete base, and portland cement concrete band edge.

Add to section 15-3.04:

No deduction will be made from any excavation quantities for the quantity of rock blanket, including portland cement concrete base and portland cement concrete band edge removed.

Add to section 15-4.01C(1):

Remove the following portions of bridges:

Bridge no.	Description of work
Location A North Anaheim OH (Br. No. 55-0216)	Barrier, deck overhang, deck, pier protection wall and footing, abutment shear key, deck, wing wall, slope paving and piles
Location B Acacia Street UC (Br. No. 55-0218)	Barrier, sound wall, deck overhang, deck, abutment shear key, wing wall, and slope paving
Location C East Street UC (Br. No. 55-0245)	Barrier, deck overhang, deck, wing wall and slope paving
Location D Euclid Street UC (Br. No. 55-0279)	Barrier, deck overhang, deck, wing wall and slope paving
Location E Brookhurst Ave UC (Br. No. 55-0280)	Barrier, deck overhang, deck, retaining wall, wing wall and slope paving
Location F State College Blvd UC (Br. No. 55-0852)	Barrier, deck overhang, wing wall and slope paving
Overhead sign H Station "A" 131+97	Top of double reinforced concrete box culvert

Add to section 15-5.05A(2):

Submit a public safety plan under section 5-1.23. Include the following:

1. A public notification letter describing the work to be performed with treatment work locations, dates and times. Include a list of addresses of delivery and posting of the letter.
2. An airborne emissions monitoring plan. A CIH certified in comprehensive practice by the American Board of Industrial Hygiene must prepare and execute the plan. The plan must have at least 4 monitoring points including the mixing point, application point, and point of nearest public contact.
3. An action plan for protecting the public if airborne emissions levels exceed permissible levels.
4. A copy of the CIH's certification.

Submit results from airborne emissions monitoring of the test area before starting production work.

Submit results from production airborne emissions monitoring as an informational submittal after completing treatment activities.

Add to the list in the 3rd paragraph in section 15-5.05A(3):

7. Demonstrate suitability of the airborne emissions monitoring plan

Add to section 15-5.05C:

Deliver the public notification letter to residences and businesses within 100 feet of treatment work and to local fire and police officials at least 7 days before starting treatment activities. Post the letter at the job site.

Monitor airborne emissions during treatment activities.

Replace "Reserved" in section 19-3.03A with:

Where shown, remove material below the bottom of bridge footings. Replace with structure backfill (bridge) and place and compact as specified for structure backfill in section 19-3.03E.

Where shown, structure backfill (bridge) must meet low expansive material requirements.

Where shown, remove material below the bottom of retaining wall footings. Replace with structure backfill and place and compact as specified for structure backfill in section 19-3.03E. Relative compaction must be at least 95 percent.

Add to section 19-3.04:

Removal of the material below the bottom of the bridge or retaining wall footings is paid for as structure excavation (bridge) or structure excavation (retaining wall).

Material placed below bridge or retaining wall footings is paid for as structure backfill (bridge) or structural backfill (retaining wall).

Pervious backfill material placed within the limits of payment for bridges is paid for as structure backfill (bridge). Pervious backfill material placed within the limits of payment for retaining walls is paid for as structure backfill (retaining wall).

Add to section 19-6.03D:

Surcharges are required for bridge approach embankments as shown in the following table:

Bridge name or number	Abutment number	Bent number	Surcharge height (feet)	Settlement period (days)
North Anaheim OH (Widen)	1 and 5	--	30.0	--
Acacia Street UC (Widen)	1 and 4	--	19.0	--
East Street UC (Widen)	1 and 5	--	19.0	--
Euclid Street UC (Widen)	1 and 5	--	20.0	--
Brookhurst Avenue UC (Widen)	1 and 5	--	19.0	--
State College Blvd UC (Widen)	1 and 3	--	22.0	--

^aAt this location, the surcharge embankment must be constructed by extending the grading plane (GP) in the "Elevation" view of the "Bridge Embankment Surcharge" detail of Standard Plan A62B horizontally to the centerline of abutment.

Add to section 19-7.02C:

The portion of imported borrow placed within 4 feet of the finished grade must have a resistance (R-Value) of at least 40, with a Plasticity Index (PI) less than 12 and an Expansion Index (EI) less than 50.

7. Pesticides used for maintaining existing planted areas must comply with section 20-1.02B.
8. Water plants automatically if the new irrigation system for that area is operational.
9. Existing plant basins, if still required as determined by the Engineer, must be kept well-formed and free of silt. If the existing plant basins need repairs, and the basins contain mulch, replace the mulch after the repairs are done.

Add to section 20-2.04:

Prune existing plants to be maintained as ordered. Pruning existing plants to be maintained is change order work.

Replace section 20-3.01C(3) with:

20-3.01C(3) Control and Neutral Conductors Schedule of Values

Submit a schedule of values for control and neutral conductors. Submit the schedule after the wiring plans and diagrams for the electrical components of the irrigation system, except electrical service, have been authorized.

The unit descriptions shown in the table are the minimum. You may include additional unit descriptions. Include the quantity, value, and amount for those additional unit descriptions.

Use the authorized wiring plan and diagrams to determine the quantities required to complete the work.

No adjustment in compensation is made in the contract lump sum price paid for control and neutral conductors work due to differences between the quantities shown in the schedule of values for control and neutral conductors work and the quantities required to complete the work.

Schedule of Values for Control and Neutral Conductors

Contract no. 12-0C5704				
Unit description	Unit	Approximate quantity	Value	Amount
12 AWG (UF) conductors (provide size)	LF	14,000		
No. 5 or larger pull box	EA	17		
Splices	EA	660		

Total _____

Add to section 20-3.02E(2):

Conductors that comply with section 20-3.02E(1) may be used when installed in electrical conduit instead of using armor-clad conductors.

Add to section 20-3.02F:

Filter cartridges must be stainless steel and be capable of 80 size mesh filtration.

Irrigation controller enclosure cabinet doors must not be furnished with integral door locks. Irrigation controller enclosure cabinet door handles must allow padlocking in the latched position. The padlock is furnished by the Engineer.

Fabricate mounting panels using 3/4-inch exterior AC grade veneer plywood. Paint panels with 1 application of an exterior, latex based, wood primer and 2 applications of an exterior, vinyl acrylic enamel, white in color. Paint panels on all sides and edges before installation of the panels in the cabinets and the equipment on the panels.

Replace the 2nd sentence of the 3rd paragraph of section 20-3.02P(2) with:

Color of drain grate must be sand.

Replace the 4th paragraph of section 20-3.02P(2) with:

Pea gravel for filling the drainpipe must have a maximum diameter of 1/2 inch. Pea gravel must be naturally rounded aggregate, clean, washed, dry and free from clay or organic material.

Add to section 20-3.02R(1):

Ball valves must be PVC or Chlorinated PVC ball valves.

Add to section 20-3.02R(3)(b):

Remote control valves must be glass filled nylon.

Add to section 20-3.02R(3)(b):

Valves must be combination angle pattern, bottom inlet and side inlet, installed as an angle pattern, bottom inlet, as shown.

Add to section 20-3.02(R)(7):

Pressure relief valves must be preset at the factory for relief at 120 psi.

Replace section 20-3.02V with:

20-3.02V Water Meters

Water meters for the irrigation systems are furnished and installed by the servicing utility at the locations shown.

Make the arrangements and pay the costs and fees required by the servicing utility.

The Anaheim Public Utilities Department has established a fee of \$1040 for relocating and installing a water meter. If, at the time of installation, this fee has changed, the Department takes a credit for the reduction in the fee, or the Department pays the difference for the increase in the fee. The credit or payment is taken or paid on the 1st monthly progress payment made after the meter is installed. Submit a copy of the invoice for the installation fee.

Make arrangements for furnishing and applying water until the water meters have been installed by the servicing utility.

Replace section 20-3.03C(1)(c) with:

20-3.03C(1)(c) Directional Boring

Notify the Engineer 2 working days before starting directional bore operations. Perform directional bore operations in the presence of the Engineer.

Conduits installed by the directional bore method must be PVC Schedule 40 and comply with section 20-3.02M(3)(a).

The diameter of the boring tool for directional boring must be only as large as necessary to install conduit. Only use mineral slurry or wetting solution to lubricate the boring tool and to stabilize the soil surrounding the boring path. Mineral slurry or wetting solution must be water based and environmentally safe.

Dispose of residue from directional boring operations.

The directional bore equipment must have directional control of the boring tool and an electronic boring tool location detection system. During operation the directional bore equipment must be able to determine the location of the tool both horizontally and vertically.

You must have direct charge and control of the directional bore operation at all times.

Replace the 5th paragraph of section 20-3.03E(2) with:

Replacement of ground cover that is removed or rototilled is not required.

Replace the last paragraph in section 20-3.03E(2) with:

Dispose of removed ground cover and prunings or reduce to chips and spread within the job site. Spread chipped material at locations determined by the Engineer. Chipped material must not be substituted for mulch, nor must the chipped material be placed within areas to receive mulch.

Add to section 20-3.04:

Payment for disposing of existing turf sod, furnishing and placing imported topsoil, and furnishing and sowing seed is included in the payment for the various sizes of plastic pipe supply line.

Replace the 1st sentence in the 3rd paragraph in section 20-7.03B(1) with:

Dispose of removed existing plants or reduce to chips and spread within the job site. Spread chipped material at locations determined by the Engineer. Chipped material must not be substituted for mulch, nor must the chipped material be placed within areas to receive mulch.

Add to section 20-7.03B(2):

Weeds must be killed within the highway, except for existing planting areas to be maintained, and excluding median areas, new and existing pavement, curbs, sidewalks, and other surfaced areas.

Replace the 1st paragraph in section 20-7.03B(2) with:

Dispose of weeds killed during the initial roadside clearing.

Add to section 20-7.03C:

Plants adjacent to drainage ditches must be located so that after construction of the basins, no portion of the basin wall is less than the minimum distance shown for each plant involved.

3. Proportions of hydraulic cement and aggregate
4. Types and amounts of chemical admixtures
5. Maximum time allowed between batching and placing
6. Range of ambient temperatures over which the mix design is effective
7. Final set time
8. Test result from California Test 548 testing, if required

Submit more than 1 mix design to plan for ambient temperature variations anticipated during LCBRS placement. Each mix design must have a maximum ambient temperature range of 18 degrees F.

Submit strength development data for each mix design. You may use strength development data from laboratory-prepared samples. The testing ages for strength development data must include 1 hour before opening age, opening age, 1 hour after opening age, 24 hours, and 7 days.

28-3.01B(2) LCBRS Field Qualification

Submit field qualification data and test reports including:

1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cubic yards
4. Type and source of ingredients used
5. Age and strength at time of cylinder testing

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

28-3.01B(3) Quality Control

Prepare compressive strength test specimens under California Test 540. Test compressive strength specimens under California Test 521. Perform at least 1 test at opening age for each 130 cubic yards placed. One test is 2 cylinders.

28-3.01C Definitions

final set time: Time a specific penetration resistance of 4,000 psi is achieved as determined under ASTM C 403.

opening age: Time the concrete achieves the specified strength for opening to traffic.

28-3.02 MATERIALS

28-3.02A Cement

Cement for LCBRS must comply with 1 of the following:

1. Cement for portland cement concrete specified in section 90 except Type III cement may be used
2. A proprietary cementitious material in compliance with the specifications for cement in section 90, except:
 - 2.1. Cementitious material must meet the definition of hydraulic cement in ASTM C 219, and the following requirements:

Proprietary cementitious material

Property	Test	Requirement
Contraction in air	California Test 527, w/c ratio = 0.39±0.010	0.053 percent, max
Mortar expansion in water	ASTM C 1038	0.04 percent, max
Soluble chloride*	California Test 422	0.05 percent, max
Soluble sulfate*	California Test 417	0.30 percent, max
Thermal stability	California Test 553	90 percent, min
Compressive strength at 3 days	ASTM C 109	2500 psi

*Test is to be done on a cube specimen fabricated in conformance with the requirements in ASTM C 109, cured at least 14 days, and then pulverized so that 100% passes the No. 50 sieve.

- 2.2. You may use citric acid or borax if you submit a written request by the cement manufacturer and a test sample.

28-3.02B Aggregates

Aggregate for LCBRS must comply with either of the following:

1. Section 90-1.02C and 90-1.02C(4)
2. Section 28-1.02 and the following:
 - 2.1. Perform California Test 548 except part H.

28-3.02C Field Qualification

Proposed mix proportions must be field qualified before you place concrete pavement. Use an ACI certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

The Engineer accepts field qualification if 5 cylinders for each age made under California Test 540 and tested under California Test 521 or under ASTM C 1231 comply with the following:

1. At a minimum, cylinders are tested at opening age, and 7 days of age
2. At opening age no single cylinder is less than 180 psi and the average strength is at least 200 psi
3. At 7 days age no single cylinder is less than 600 psi and the average strength is at least 725 psi

28-3.03 CONSTRUCTION

28-3.03A General

LCBRS must have a compressive strength of 200 psi at opening age and 725 psi at 7 days of age. LCBRS must have a compressive strength of 450 psi before placing HMA, base, or operating equipment on it. Concrete paving activities may commence after final set time of LCBRS. The pavement may be opened to traffic after opening age of LCBRS.

28-3.03B Proportioning

Weighing, measuring, and metering devices used for proportioning materials must comply with section 9-1.02.

For central batch plants, indicators for weighing and measuring systems such as over and under dials must be grouped so that each indicator's smallest increment can be accurately read from the control point of the proportioning operation. In addition, indicators for weighing and measuring cement batched from a remote weighing system must be placed such that each indicator can be accurately read from the control point of the proportioning operation.

Weighing equipment must be insulated from other equipment's vibration or movement. When the plant is operating, each draft's material weight must not vary from the designated weight by more than the specified tolerances. Each scale graduation must be 0.001 of the usable scale capacity.

Aggregate must be weighed cumulatively. Equipment for weighing aggregate must have a zero tolerance of ± 0.5 percent of the aggregate's designated total batch weight. Equipment for the separate weighing of the cement must have a zero tolerance of ± 0.5 percent of the cement's designated individual batch draft. Equipment for measuring water must have a zero tolerance of ± 0.5 percent of the water's designated weight or volume.

The weight indicated for any individual batch of material must not vary from the preselected scale setting by more than:

Material	Tolerance
Aggregate	± 1.0 percent of designated batch weight
Cement	± 0.5 percent of designated batch weight
Water	± 1.5 percent of designated batch weight or volume

If you choose aggregate that complies with sections 90-1.02C and 90-1.02C(4), proportioning consists of dividing the aggregate into the specified sizes and storing them in separate bins, and then combining the aggregate with cement and water. Control the aggregate discharged from several bins with gates or mechanical conveyors. The means of discharge from the bins and from the weigh hopper must be interlocked so that no more than 1 bin can discharge at a time, and the weigh hopper cannot be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

Proportion dry ingredients by weight. Proportion liquid ingredients by weight or volume.

Handle and store aggregates under section 90-1.02F(2). Proportion liquid admixtures under section 90-1.02F(4)(b).

At the time of batching, dry and drain aggregates to a stable moisture content. Do not proportion aggregates with visible separation of water from the aggregate during proportioning. At the time of batching, the free moisture content of fine aggregate must not exceed 8 percent of its saturated surface-dry weight.

If the proportioning plant has separate supplies of the same size group of aggregate with different moisture content, specific gravity, or surface characteristics affecting workability, exhaust 1 supply before using another supply.

Keep cement separated from the aggregate until discharged into the mixer. When discharged into the mixer, cement must be free of lumps and clods. Before reuse, clean fabric containers used for transportation or proportioning of cement.

Weigh systems for proportioning aggregate and cement must be individual and distinct from other weigh systems. Each weigh system must have a hopper, a lever system, and an indicator.

For batches with a volume of 1 cubic yard or more, proportioning must comply with 1 of the following methods:

1. Batch the ingredients at a central batch plant and charge them into a mixer truck for transportation to the pour site. Proportion ingredients under Section 90-1.02F(4).
2. Batch the ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a cement silo and weigh system, which must proportion cement for charging into the mixer truck.
3. Batch ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a location where pre-weighed containerized cement is added to the mixer truck. The cement pre-weighing operation must utilize a platform scale. The platform scale must have a maximum capacity of 2.75 tons with a maximum graduation size of 1 pound. Pre-weigh cement into a fabric container. The minimum amount of cement to be

For the mix design of HMA Type A produced under the QC/QA construction process, determine the tensile strength ratio under California Test 371 on untreated HMA. If the tensile strength ratio is less than 70:

1. Choose from the antistrip treatments specified based on the plasticity index
2. Test treated HMA under California Test 371
3. Treat to a minimum tensile strength ratio of 70

Determine the quantity of asphalt rubber binder to be mixed with the aggregate for RHMA-G under California Test 367 except:

1. Specific gravity used in California Test 367, Section B, "Void Content of Specimen," must be determined under California Test 308, Method A.
2. California Test 367, section C, "Optimum Bitumen Content," is revised as follows:
 - 2.1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
 - 2.2. Use California Test 309 to determine theoretical maximum specific gravity and density of the RHMA-G.
 - 2.3. Plot asphalt rubber binder content versus average air voids content based on California Test 309 for each set of three specimens on Form TL-306 (Figure 3), and connect adjacent points with a best-fit curve.
 - 2.4. Plot asphalt rubber binder content versus average Hveem stability for each set of three specimens and connect adjacent points with a best-fit curve.
 - 2.5. Calculate voids in mineral aggregate (VMA) and voids filled with asphalt (VFA) for each specimen, average each set, and plot the average versus asphalt rubber binder content.
 - 2.6. Calculate the dust proportion and plot versus asphalt rubber binder content.
 - 2.7. From the curve plotted in Step 2.3, select the theoretical asphalt rubber binder content that has 5.0 percent air voids.
 - 2.8. At the selected asphalt rubber binder content, evaluate corresponding voids in mineral aggregate, voids filled with asphalt, and dust proportion to verify compliance with requirements. If necessary, develop an alternate composite aggregate gradation to conform to the RHMA-G requirements.
 - 2.9. Record the asphalt rubber binder content in Step 2.7 as the Optimum Bitumen Content (OBC).
 - 2.10. OBC must be greater than or equal to 7.5 based on total weight of mix.
3. Laboratory mixing and compaction must comply with California Test 304, except the mixing temperature of the aggregate must be from 300 to 325 degrees F. The mixing temperature of the asphalt-rubber binder must be from 375 to 425 degrees F. The compaction temperature of the combined mixture must be from 290 to 300 degrees F.

The Engineer determines the OBC under California Test 368.

Do not test RHMA-O aggregate for plasticity index and tensile strength ratio.

Add to section 39-1.11:

Before opening a lane to traffic, pave shoulders and median borders adjacent to the lane.

Do not leave a vertical joint more than 0.15 foot high between adjacent lanes open to traffic or within lanes open to traffic.

If widening existing pavement, construct new pavement structure on both sides of the existing pavement to match the elevation of the existing pavement's edge at each location before placing HMA over the existing pavement.

Replace section 39-1.12E of the RSS for section 39-1.12 with:

39-1.12E Prepaving Must-Grinds

Section 39-1.12E applies to existing asphalt concrete areas receiving an HMA overlay of less than 0.25 foot.

Prepaving profilograph includes taking profiles of the existing pavement, determining must-grinds, and submitting profilograms.

Prepaving grinding day includes correcting must-grinds and taking profiles of the corrected areas and submitting profilograms.

Before starting paving operations, determine must-grinds on the existing pavement under California Test 526. Take 2 profiles within each traffic lane, 3 feet from and parallel with the edge of each lane. Profile the pavement in the Engineer's presence.

Submit profilograms and locations of must-grinds.

Notify the Engineer of those must-grinds that cannot be corrected by prepaving grinding. The Engineer responds to your notification within 5 business days.

For those must-grinds that cannot be corrected by grinding, the Engineer may order you to either (1) not correct the must-grinds or (2) correct must-grinds by a different method and take profiles of the corrected areas with a profilograph.

Corrective work not performed by prepaving grinding, including taking profiles of the corrected areas and associated traffic control, is change order work.

Correct prepaving must-grinds that you predict will cause the top layer of HMA to be noncompliant with the smoothness specifications. After correcting prepaving must-grinds, take profiles of the corrected area and submit profilograms.

Dispose of grinding residue.

Pave within 7 days of correcting areas.

The HMA pavement top layer must comply with section 39-1.12. The 2nd paragraph of section 39-1.12A and the 3rd paragraph of section 39-1.12C do not apply regardless of the type of HMA used.

If ordered not to correct prepaving must-grinds, the smoothness specifications do not apply to the top layer of HMA placed in those areas.

Smoothness correction of the top layer of HMA must leave at least 75 percent of the specified HMA thickness. If ordered, core the pavement at the locations determined by the Engineer. Coring, including traffic control, is change order work. Remove and replace deficient pavement areas where the overlay thickness is less than 75 percent of the thickness specified as determined by the Engineer.

Replace section 39-1.19 with:

39-1.19 HOT MIX ASPHALT AGGREGATE LIME TREATMENT—SLURRY METHOD

39-1.19A General

39-1.19A(1) Summary

Treat HMA aggregate with lime using the slurry method and place it in stockpiles to marinate.

39-1.19A(2) Submittals

Determine the exact lime proportions for fine and coarse virgin aggregate and submit them as part of the proposed JMF.

Submit the averaged aggregate quality test results within 24 hours of sampling.

Submit a treatment data log from the slurry proportioning device in the following order:

1. Treatment date
2. Time of day the data is captured
3. Aggregate size being treated
4. Wet aggregate flow rate collected directly from the aggregate weigh belt
5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight

6. Dry aggregate flow rate calculated from the wet aggregate flow rate
7. Lime slurry flow rate measured by the slurry meter
8. Dry lime flow rate calculated from the slurry meter output
9. Authorized lime ratio for each aggregate size being treated
10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
11. Calculated difference between the authorized lime ratio and the actual lime ratio
12. Dry lime and water proportions at the slurry treatment time

Every day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

39-1.19A(3) Quality Control and Assurance

The QC plan must include aggregate quality control sampling and testing during aggregate lime treatment. Sample and test in compliance with frequencies in the following table:

Aggregate Quality Control During Lime Treatment

Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent	California Test 217	Once per 1,000 tons of aggregate treated with lime
Percent of crushed particles	California Test 205	As necessary and as designated in the QC plan
Los Angeles Rattler	California Test 211	
Fine aggregate angularity	California Test 234	
Flat and elongated particles	California Test 235	

Note: During lime treatment, sample coarse and fine aggregate from individual stockpiles. Combine aggregate in the JMF proportions. Run tests for aggregate quality in triplicate and report test results as the average of 3 tests.

For any of the following, the Engineer orders proportioning operations stopped if you:

1. Do not submit the treatment data log
2. Do not submit the aggregate quality control data
3. Submit incomplete, untimely, or incorrectly formatted data
4. Do not take corrective actions
5. Take late or unsuccessful corrective actions
6. Do not stop treatment when proportioning tolerances are exceeded
7. Use malfunctioning or failed proportioning devices

If you stop treatment, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

For the aggregate to be treated, determine the moisture content at least once during each 2 hours of treatment. Calculate moisture content under California Test 226 or 370 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

39-1.19B Materials

High-calcium hydrated lime and water must comply with section 24-2.02.

Before virgin aggregate is treated, it must comply with the aggregate quality specifications. Do not test treated aggregate for quality control except for gradation. The Engineer does not test treated aggregate for acceptance except for gradation.

The Engineer determines the combined aggregate gradation during HMA production after you have treated the aggregate. If RAP is used, the Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.

Treated aggregate must not have lime balls or clods.

39-1.19C Construction

39-1.19C(1) General

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Treat aggregate separate from HMA production.

Do not treat RAP.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to from 2 to 3 parts water by weight. The slurry must completely coat the aggregate.

Lime treat and marinate coarse and fine aggregates separately.

Immediately before mixing lime slurry with the aggregate, water must not visibly separate from the aggregate.

Treat the aggregate and stockpile for marination only once.

The lime ratio is the pounds of dry hydrated lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

The following aggregate gradations must have the lime ratio ranges shown in the following table:

Aggregate gradation	Lime ratio percent
Coarse	0.4–1.0
Fine	1.5–2.0
Combined virgin aggregate	0.8–1.5

You may reduce the combined aggregate lime ratio for OGFC to 0.5–1.0 percent.

The lime ratio for fine and coarse aggregate must be within ± 0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ± 0.2 percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If 3 consecutive sets of recorded treatment data indicate deviation more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the day's total treatment in HMA.

If you stop treatment for noncompliance, you must implement corrective action and successfully treat aggregate for a 20-minute period. Notify the Engineer before beginning the 20-minute treatment period.

39-1.19C(2) Lime Slurry Proportioning

Proportion lime and water with a continuous or batch operation.

The device controlling slurry proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by the data set is the quantity produced 5 minutes before and 5 minutes after the capture time. For the Contract's duration, collected data must be stored by the controller.

39-1.19C(3) Proportioning and Mixing Lime Slurry Treated Aggregate

Treat HMA aggregate by proportioning lime slurry and aggregate by weight in a continuous operation.

Marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

39-1.19D Payment

Payment for treating aggregates with lime slurry is included in payment for the HMA involved.

Replace section 39-1.30 with:

39-1.30 EDGE TREATMENT, HOT MIX ASPHALT PAVEMENT

39-1.30A General

Section 39-1.30 includes specifications for constructing the edges of HMA pavement as shown.

39-1.30B Materials

For the safety edge, use the same type of HMA used for the adjacent lane or shoulder.

39-1.30C Construction

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

For safety edge treatment, the angle of the slope must not deviate by more than ± 5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the safety edge treatment can be placed either with each lift or with the final lift.

Short sections of hand work are allowed to construct transitions for safety edge treatment.

For more information on the safety edge treatment, go to:

http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge/

You can find a list of commercially available devices at the above Web site under "Frequently Asked Questions" and "Construction Questions."

39-1.30D Payment

Not Used

Add to section 39-6:

The bid item for place hot mix asphalt (miscellaneous area) is limited to the areas shown and is in addition to the bid items for the materials involved.

The Engineer may waive training for personnel who have completed equivalent training within the 12 months preceding JITT. Submit certificates of completion for the equivalent training.

The Engineer determines the costs for providing JITT under section 9-1.04 except no markups are added and you are paid for 1/2 of the JITT cost. Costs for providing JITT include training materials, class site, and the JITT instructor, including the JITT instructor's travel, lodging, meals and presentation materials. The Department does not pay your costs for attending JITT.

Replace section 40-1.01D(7)a with:

40-1.01D(7)a Testing for Coefficient of Thermal Expansion

Perform coefficient of thermal expansion testing under AASHTO T 336 at a frequency of 1 test for each 5,000 cubic yards of paving but not less than 1 test for projects with less than 5,000 cubic yards of concrete. This test is not used for acceptance.

For field qualification, perform coefficient of thermal expansion testing under AASHTO T 336.

Replace "Reserved" in section 40-1.02I(1) with:

Liquid joint sealant for longitudinal and transverse contraction joints and isolation joints must be silicone.

Longitudinal contraction joint must be Type B. Transverse contraction joint must be Type B.

Replace section 40-2 with:

40-2 JOINTED PLAIN CONCRETE PAVEMENT

40-2.01 GENERAL

40-2.01A Summary

Section 40-2 includes specifications for constructing JPCP.

40-2.01B Submittals

40-2.01B(1) General

Not Used

40-2.01B(2) Early Age Crack Mitigation System

At least 24 hours before each paving shift, submit the following information as an informational submittal:

1. Early age stress and strength predictions
2. Scheduled sawing and curing activities
3. Contingency plan if cracking occurs

40-2.01C Quality Control and Assurance

40-2.01C(1) General

Not Used

40-2.01C(2) Quality Control Plan

The QC plan must include a procedure for identifying transverse contraction joint locations relative to the dowel bars longitudinal center and a procedure for consolidating concrete around the dowel bars.

40-2.01C(3) Early Age Crack Mitigation System

For PCC concrete pavement, develop and implement a system for predicting stresses and strength during the initial 72 hours after paving. The system must include:

1. Subscription to a weather service to obtain forecasts for wind speed, ambient temperatures, humidity, and cloud cover
2. Portable weather station with an anemometer, temperature and humidity sensors, located at the paving site
3. Early age concrete pavement stress and strength prediction computer program

4. Analyzing, monitoring, updating, and reporting the system's predictions

40-2.02 MATERIALS

Not Used

40-2.03 CONSTRUCTION

40-2.03A General

Transverse contraction joints on a curve must be on a single straight line through the curve's radius point.

40-2.03B Tie Bar Placement

If the curvature of a concrete pavement slab prevents equal spacing of tie bars to maintain the minimum clearance from transverse joints, space them from 15 to 18 inches.

40-2.03C Ramp Termini

For ramp termini, use heavy brooming normal to the ramp centerline to produce a coefficient of friction of at least 0.35 determined on the hardened surface under California Test 342.

40-2.03D Removal and Replacement

When replacing concrete, saw cut and remove to full depth and width.

Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and where the Engineer orders. You may make additional saw cuts within the removal area to facilitate slab removal or to prevent binding of the saw cut at the removal area's edge. Saw cut perpendicular to the slab surface.

Use slab lifting equipment with lifting devices that attach to the slab. After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete using dowel bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bar holes from the original dowel bar by 3 inches.

Drill holes and use chemical adhesive to bond the dowel bars to the existing concrete. Use an automated dowel bar drilling machine. Holes must be at least 1/8-inch greater than the dowel bar diameter. Clean the holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry when you place chemical adhesive.

Immediately after inserting dowel bars into the chemical adhesive-filled holes, support the dowel bars and leave them undisturbed for the minimum cure time recommended by the chemical adhesive manufacturer.

Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under section 28-2.03F. For partial slab replacements, place preformed sponge rubber expansion joint filler at new transverse joints under ASTM D 1752.

40-2.04 PAYMENT

Not Used

Replace section 40-4 with:

40-4 JOINTED PLAIN CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)

40-4.01 GENERAL

40-4.01A Summary

Section 40-4 includes specifications for constructing jointed plain concrete pavement (JPCP) with rapid strength concrete (RSC).

Section 40-1 does not apply.

40-4.01B Definitions

early age: Time less than 10 times the concrete's final set time.

final set time: Time a specific penetration resistance of 4,000 psi is achieved, determined under ASTM C 403.

opening age: Time the concrete achieves the specified strength for opening to traffic.

opening strength: Specified strength for concrete before opening to traffic.

transverse crack: A crack running from 1 longitudinal edge of the panel to the other.

40-4.01C Submittals

Submit AASHTO T 336 coefficient of thermal expansion test results and at the website <http://169.237.179.13/cte/>.

For rejected test strips, submit a plan for changed materials, methods, or equipment before constructing additional test strips.

40-4.01D Quality Control and Assurance

40-4.01D(1) General

Perform profilograph testing on concrete shoulders. Testing and test results must comply with the specifications for concrete pavement smoothness, profilograph test procedure, and corrective action for traffic lanes.

40-4.01D(2) Mix Design

At least 10 days before use in a test strip, submit a mix design for RSC that includes:

1. Opening age
2. Proposed aggregate gradation
3. Proportions of hydraulic cement and aggregate
4. Types and amounts of chemical admixtures
5. Maximum time allowed between batching and placing
6. Range of ambient temperatures over which the mix design is effective
7. Final set time
8. Any special instructions or conditions such as water temperature requirements

Submit more than 1 mix design to plan for ambient temperature variations anticipated during RSC placement. Each mix design must have a maximum ambient temperature range of 18 degrees F.

Submit modulus of rupture development data for each mix design. You may use modulus of rupture development data from laboratory-prepared samples. The testing ages for modulus of rupture development data must include 1 hour before opening age, opening age, 1 hour after opening age, 24 hours, 7 days, and 28 days.

During concrete mix design, perform coefficient of thermal expansion testing under AASHTO T 336 from trial mixture samples. Provide a split test sample to METS. If changing an aggregate supply source or the mix properties or proportions, perform coefficient of thermal expansion testing for the new concrete mix.

40-4.01D(3)(a) Calibration Testing Certificates of Compliance

Submit a certificate of compliance under section 6-3.05E with each delivery of aggregate, cementitious material, and admixtures used for calibration tests. Include certified copies of the weight of each delivery.

The certificate of compliance must state that the source of materials used for the calibration tests is the same source as to be used in the work. The certificate must be signed by your assigned representative.

40-4.01D(3)(b) Cement and Admixtures

At least 45 days before intended use, submit a sample of cement from each proposed lot and samples of proposed admixtures in the quantities ordered by the Engineer.

During RSC pavement operations, submit uniformity reports for hydraulic cement at least once every 30 days to METS, Attention: Cement Laboratory. Uniformity reports must comply with ASTM C 917, except testing age and water content may be modified to suit the particular material.

40-4.01D(4) Quality Control Program

40-4.01D(4)(a) General

Establish a quality control program to ensure that methods and procedures to produce and place RSC comply with the specifications for RSC.

If the quality control program is not implemented and followed, the Engineer orders RSC work stopped.

40-4.01D(4)(b) Quality Control Managers

For the project, designate a lead QC Manager and assistant QC Managers.

The lead QC Manager administers the quality control plan (QC Plan). The lead QC Manager must hold current American Concrete Institute (ACI) certification as "Concrete Field Testing Technician-Grade I" and "Concrete Laboratory Testing Technician-Grade II." Assistant QC Managers must hold current ACI certification as "Concrete Field Testing Technician-Grade I" and either "Concrete Laboratory Testing Technician-Grade I" or "Concrete Laboratory Testing Technician-Grade II."

The QC Manager responsible for the production period involved must review and sign the sampling, inspection, and test reports. At least 1 QC Manager must be present for:

1. Each stage of mix design
2. Test strip construction
3. Production and construction of RSC
4. Meetings with the Engineer relating to production, placement, or testing.

A QC Manager must not be a member of this project's production or paving crews, an inspector, or a tester. A QC Manager must have no duties during the production and placement of RSC except those specified.

40-4.01D(4)(c) Quality Control Plan

The QC Plan describes the procedures you will use to control the production process including:

1. Determining if changes to the production process are needed
2. Procedures for proposing changes
3. Procedures for implementing changes

Do not start RSC work until the QC Plan has been accepted by the Engineer. The Engineer accepts the QC Plan based on the inclusion and adequacy of:

1. Names and qualifications of the lead Quality Control Manager (QCM) and assistant QCMs.
2. Outline procedure for the placement and testing of test strips
3. Outline procedure for the production, transportation, and placement of RSC
4. Outline procedure for sampling and testing to be performed during and after RSC construction
5. Contingency plan for correcting problems in production, transportation, or placement. Include the quantity and location of standby material in your contingency plan.
6. Provisions for determining if RSC placement must be suspended and temporary roadway pavement structure constructed
7. Forms to report inspection, sampling, and testing
8. Location of your quality control testing laboratory and testing equipment during and after paving operations
9. List of the testing equipment to be used including date of last calibration
10. Names and certifications of quality control personnel including those performing sampling and testing

At the time of QC Plan submission, the Department qualifies the quality control samplers and testers through the Independent Assurance Program (IAP) for the sampling and testing they perform.

40-4.01D(4)(d) Quality Control Inspection, Sampling, and Testing

Perform quality control sampling, testing, and inspection throughout RSC production and placement. Before any sampling and testing, give the Engineer at least 2 business days notice. Give the Engineer unrestricted access to your quality control inspectors, samplers, testers, and laboratories. Submit testing results within 15 minutes of testing completion. Record inspection, sampling, and testing on the forms accepted with the QC Plan and submit them within 48 hours of completion of each paving shift and within 24 hours of 7-day modulus of rupture tests.

Provide a testing laboratory to perform quality control tests. Maintain sampling and testing equipment in proper working condition. Perform sampling under California Test 125.

Testing laboratories and testing equipment must comply with the Department's Independent Assurance Program.

40-4.01D(4)(e) Test Strips

The first paving activity must be to construct a test strip:

1. 700 to 1,000 feet long
2. Same width as the planned paving
3. With the same equipment used for the planned paving

The Engineer evaluates the test strip for compliance with the specifications for acceptance criteria.

The Engineer selects from 6 to 12 core locations for dowel bars and up to 6 locations for tie bars per test strip.

If you use mechanical dowel bar inserters, the test strip must demonstrate they do not leave voids, segregations, or surface irregularities such as depressions, dips, or high areas.

Allow the Engineer 3 business days to evaluate the test strip for:

1. Smoothness
2. Dowel bar and tie bar alignment
3. Thickness
4. Final finishing except coefficient of friction

During the 3 business day evaluation, the Engineer rejects a test strip if:

1. Surface varies more than 0.02 foot from a 12-foot straightedge's lower edge
2. Wheel path's individual high points are greater than 0.025 foot in 25 feet
3. Dowel bars do not comply with specified placement tolerances
4. Concrete pavement thickness deficiency is greater than 0.05 foot
5. Final finishing does not comply with the specifications except coefficient of friction

Remove the test strip if the Engineer rejects it for noncompliance with the specifications for dowel bar alignment or thickness. Dispose of rejected test strip material.

If the Engineer rejects the test strip for noncompliance with the smoothness or final finishing specifications except coefficient of friction, you may grind the test strip into compliance if you intend to leave it as part of the paving.

If the Engineer does not reject the test strip during the 3-day evaluation, you may begin production paving while the Engineer continues to evaluate the test strip for compliance with the other specifications. If the Engineer rejects the test strip for noncompliance with the other specifications, stop production paving until you construct a test strip the Engineer accepts.

Construct additional test strips until the Engineer accepts one.

Construct additional test strips if you:

1. Propose different paving equipment including:
 - 1.1. Batch plant
 - 1.2. Paver

- 1.3. Dowel bar inserter
- 1.4. Tie bar inserter
- 1.5. Tining
- 1.6. Curing equipment
2. Change concrete mix proportions

During test strip construction, sample and split the aggregate for gradings, cleanness value, and sand equivalent testing.

Test strip must comply with the QC Plan for RSC production and placement. The QC Plan must detail your intended:

1. Locations and times
2. Production procedures
3. Placement and finishing methods
4. Sampling methods, sample curing, and sample transportation
5. Testing and test result reporting

Within 20 minutes after rapid strength concrete delivery for test strips, fabricate test beams under California Test 524. Use beams to determine early age and 7-day modulus of rupture values.

Cure beams fabricated for early age testing so that the monitored temperatures in the beams and the test strip are always within 5 degrees F. Monitor and record the internal temperatures of test strip and early age beams at intervals of at least 5 minutes. Install thermocouples or thermistors connected to strip-chart recorders or digital data loggers to monitor the temperatures. Temperature recording devices must be accurate to within ± 2 degrees F. Measure internal temperatures at 1 inch from the top, 1 inch from the bottom, and no closer than 3 inches from any edge until early age testing is completed.

Cure beams fabricated for 7-day testing under California Test 524 except place them into sand at a time that is from 5 to 10 times the final set time, or 24 hours, whichever is earlier.

Test strip must have an early age modulus of rupture of not less than 400 psi and a 7-day modulus of rupture of not less than 600 psi.

Dispose of test strip and test specimens for test strip.

40-4.01D(4)(f) Production Process Control and Quality Control Testing

Contingency plan equipment and personnel must be present at the job site.

Provide continuous process control and quality control sampling and testing throughout RSC production and placement.

During production of RSC, sample and test aggregates at least once for every 650 cubic yards of RSC produced, but not less than once per placement shift. Test aggregates for compliance with gradations, cleanness value, and sand equivalent specifications.

At least once for every 650 cubic yards of RSC produced, but not less than twice per placement shift, sample and test for:

1. Yield
2. Penetration
3. Air content
4. Unit weight

During placement of RSC, fabricate beams and test for modulus of rupture within the first 30 cubic yards, at least once every 130 cubic yards, and within the final truckload.

If requested, submit split samples and fabricate test beams for the Engineer's testing.

For determining early age modulus of rupture, cure beams under the same conditions as the pavement until 1 hour before testing. Cure beams fabricated for the 7-day test under California Test 524. The Engineer uses modulus of rupture test results for accepting or rejecting the replacement pavement and determining pay factor adjustment for low modulus of rupture.

Dispose of materials resulting from the construction of the test beams, temporary roadway pavement structure, and rejected replacement pavement.

40-4.01D(4)(g) Weighmaster Certificates

Submit weighmaster certificates for RSC. Regardless of the proportioning method used, the certificates must include all the information necessary to trace the manufacturer and the manufacturer's lot number for the cement being used. The weighmaster certificates for the cement must include:

1. Date of proportioning
2. Location of proportioning
3. Actual net draft cement weight, if proportioned into fabric containers
4. Net draft cement weight used in the load, if proportioned at the pour site from a storage silo

40-4.01D(5) Engineer's Acceptance for Modulus of Rupture

RSC pavement must develop a minimum modulus of rupture of 400 psi before opening to traffic. RSC pavement must develop a minimum modulus of rupture of 600 psi 7 days after placement. The Engineer may accept RSC pavement that does not attain the specified moduli of rupture as specified in "Pay Factor Adjustment for Low Modulus of Rupture." The Engineer determines the modulus of rupture by testing 3 beam specimens under California Test 524 and averaging the results. You may fabricate beam specimens using an internal vibrator under ASTM C 31. No single test represents more than that day's production or 130 cubic yards, whichever is less.

Beam specimens for early age must be cured so the temperature in the specimens is within 5 degrees F of the temperature in the pavement. You must determine the modulus of rupture at other ages using beams cured and tested under California Test 524 except place them in sand from 5 to 10 times the final set time or 24 hours, whichever is earlier. You must perform the testing to determine modulus of rupture values of the RSC pavement in the presence of the Engineer.

40-4.01D(5)(a) Pay Factor Adjustment for Low Modulus of Rupture

The Engineer adjusts payment for RSC for modulus of rupture as follows:

1. Payment for RSC with a modulus of rupture of 400 psi or greater before opening to traffic and 7-day modulus of rupture of 600 psi or greater is not adjusted.
2. Payment for RSC with a 7-day modulus of rupture less than 500 psi is not adjusted and no payment is made. Remove this RSC and replace it at your expense with RSC that complies with the specifications.
3. Payment for RSC with a modulus of rupture less than 350 psi before opening to traffic is not adjusted and no payment is made. Remove this RSC and replace it at your expense with RSC that complies with the specifications.
4. Payment for RSC with a modulus of rupture of 350 psi or greater before opening to traffic and a 7-day modulus of rupture greater than or equal to 500 psi is reduced by the percentage in the pay table for the quantity represented by the tests.

Percentage Pay Table

Modulus of rupture (psi) at opening to traffic	7-Day modulus of rupture (psi)		
	Greater than or equal to 600	Less than 600 and greater than or equal to 550	Less than 550 and greater than or equal to 500
Greater than or equal to 400	100%	95%	90%
Less than 400 and greater than or equal to 350	95%	95%	90%
Less than 350	0%	0%	0%

The Engineer rejects any RSC area that develops 1 or more transverse full depth random cracks within 64 days after placement. Remove this RSC at your expense and replace it with RSC that complies with the specifications.

40-4.02 MATERIALS

40-4.02A Temporary Roadway Pavement Structure

40-4.02A(1) Aggregate Base

Aggregate base for temporary roadway pavement structure must be produced from any combination of broken stone, crushed gravel, natural rough-surfaced gravel, reclaimed concrete and sand. Grading of aggregate base must comply with the 3/4-inch maximum grading specified in section 26-1.02B.

40-4.02A(2) Hot Mix Asphalt

For hot mix asphalt:

1. Choose the 3/8-inch or 1/2-inch HMA Type A or Type B aggregate gradation under section 39-1.02E.
2. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate gradation and 6.0 percent for 1/2-inch aggregate gradation.
3. Choose asphalt binder Grade PG 64-10, PG 64-16, or PG 70-10 under section 92.

40-4.02A(3) Rapid Strength Concrete

RSC that fails to meet opening strength but has a modulus of rupture of at least 200 psi may serve as temporary roadway and must be replaced before acceptance of the contract.

40-4.02B Bond Breaker

Bond breaker must be one of the following:

1. White curing paper under ASTM C 171
2. White opaque polyethylene film under ASTM C 171, except that the minimum thickness must be 6 mils
3. Paving asphalt, Grade PG 64-10, under section 92
4. Curing compound (5) under section 90-1.03B(3)

40-4.02C Rapid Strength Concrete

RSC must be one of the following:

1. Concrete complying with section 90 "Portland Cement Concrete", except you may use Type III portland cement.
2. Concrete complying with section 90 "Portland Cement Concrete", except:
 - 2.1. You may use any cement that complies with the definition of hydraulic cement or blended hydraulic cement in ASTM C 219 and the requirements shown in the following table:

Hydraulic cement ^c		
Test description	Test method	Requirement ^b
Contraction in air	California Test 527, W/C Ratio = 0.39 ±0.010	0.053 %, max.
Mortar expansion in water	ASTM C 1038	0.04 %, max.
Soluble chloride ^a	California Test 422	0.05 %, max.
Soluble sulfates ^a	California Test 417	0.30 %, max.
Thermal stability	California Test 553	90 %, min.
Compressive strength @ 3 days	ASTM C 109	2,500 psi

Note:

^a Perform test on a cube specimen fabricated under ASTM C 109. Cure the specimen at least 14 days and then pulverized to 100 percent passing the No. 50 sieve.

^b If you use chemical admixtures, include them when testing.

^c The requirements of this table does not apply to portland cement.

- 2.2. You may use citric acid or borax if you submit a written request from the cement manufacturer and a test sample.

Section 40-1.02B(2)(a) does not apply.

Supplementary cementitious material is not required in RSC.

Choose the combined aggregate grading for RSC from either the 1-1/2 inch maximum or the 1-inch maximum combined grading under section 90-1.02C(4)(d).

Aggregate for RSC must be either:

1. Innocuous in conformance with the provisions in section 90-2.02C.
2. When tested under ASTM C 1567 using the proposed aggregate and cementitious materials, the expansion is less than 0.10 percent. Submit test data with each mix design. Test data authorized by the Department no more than 3 years before the 1st day of the Contract is authorized for the entire Contract. The test data must be for the same concrete mix and must use the same materials and material sources to be used on the Contract.

You may use Type C accelerating and Type E accelerating and water reducing chemical admixtures as specified in section 90-1.02E. The requirement for air entrainment of concrete in freeze-thaw areas only applies when portland cement is used.

During concrete mix design, perform coefficient of thermal expansion testing under AASHTO T 336 from trial mixture samples. If changing an aggregate supply source or the mix properties or proportions, perform coefficient of thermal expansion testing for the new concrete mix. This test will not be used for acceptance.

40-4.02D Bar Reinforcement

Bar reinforcement must be one of the following:

1. Epoxy coated steel reinforcing bar:
 - 1.1. Bar must comply with ASTM A 615/A 615M, Grade 40 or 60; ASTM A 996/A 996M; or ASTM A 706/A 706M.
 - 1.2. Epoxy-coating must comply with ASTM A 934/A 934M. Epoxy-coating must be purple or gray and handled at the manufacturing plant and job site under ASTM D 3963/D 3963M and section 52-2.
2. Low carbon, chromium steel bar:
 - 2.1. Low carbon, chromium steel bar must comply with ASTM A 1035/A 1035 M.

40-4.02G Dowel Bar and Dowel Bar Baskets

Dowel bar and dowel bar baskets must be one of the following:

1. Epoxy coated steel reinforcing bar
 - 1.1. Reinforcing bar must comply with ASTM A 615/A 615M, Grade 40 or 60.
 - 1.2. Epoxy coating must comply with ASTM A 884/A 884M, Class A, Type 2. Epoxy coating must be purple or gray.
2. Stainless steel bar:
 - 2.1. Stainless steel bar must be descaled, pickled, and polished solid stainless steel bars, UNS Designation S31603 or S31803, Grade 60 under ASTM A 276/A 276M, and ASTM A 955/A 955M.
 - 2.2. If placed under the basket placing method, stainless steel baskets must comply with ASTM A 493/A 493M, UNS S31600 or S31603.

40-4.02H Tie Bar and Tie Bar Baskets

Tie bar and tie bar baskets must be one of the following:

1. Epoxy coated steel reinforcing bar:
 - 1.1. Bar reinforcing must comply with ASTM A 615/A 615M, Grade 40 or 60; ASTM A 996/A 996M; or ASTM A 706/A 706M
 - 1.2. Epoxy coating for deformed tie bars must comply with ASTM A 934/A 934M. Epoxy coating must be purple or gray.
 - 1.3. Epoxy coating for smooth tie bars and tie bar baskets must comply with ASTM A 884/A 884M, Class A, Type 2.

2. Stainless steel bar:
 - 2.1. Stainless steel bar must be descaled, pickled, and polished solid stainless steel bars UNS Designation S31603 or S31803, Grade 60 under ASTM A 955/A 955M. If placed under the basket placing method, baskets must be stainless steel under ASTM A 493/A 493M, UNS S31600 or S31603.

40-4.02I Liquid Joint Sealant

Liquid joint sealant for longitudinal and transverse contraction joints must be silicone.

40-4.02J Liquid Joint Sealant for Isolation Joints

Liquid joint sealant for isolation joints must be silicone.

40-4.02K Tack Coat

Tack coat must comply with section 39.

40-4.03 CONSTRUCTION

40-4.03A Tie Bar Spacing On Curves

If the curvature of a concrete pavement slab prevents equal spacing of tie bars to maintain the minimum clearance from transverse joints, space them from 15 to 18 inches.

40-4.03B Transition Joints With Hot Mix Asphalt

If a joint between concrete pavement and hot mix asphalt is specified, apply tack coat between the concrete pavement and hot mix asphalt.

40-4.03C Temporary Roadway Pavement Structure

Place hot mix asphalt and aggregate base where existing pavement is replaced for construction of a temporary roadway pavement structure. The quantity must be equal to the quantity of pavement removed during the work shift. If you place temporary roadway pavement structure, it must be maintained and later removed as the first order of work when JPCP (RSC) activities resume. The temporary roadway pavement structure must consist of 3-1/2 inch thick hot mix asphalt over aggregate base. RSC not conforming to the specifications may be used for temporary roadway pavement structure with the Engineer's approval.

Spread and compact aggregate base and hot mix asphalt by methods that produce a well-compacted, uniform base, with a surface of uniform smoothness, texture and density. Surfaces must be free from pockets of coarse or fine material. You may spread aggregate base and hot mix asphalt each in one layer. The finished surface of hot mix asphalt must not vary more than 0.05 foot from the lower edge of a 12-foot long straightedge placed parallel with the centerline and must match the elevation of existing concrete pavement along the joints between the existing pavement and temporary surfacing.

After removing temporary roadway pavement structure, you may stockpile removed aggregate base at the project site and reuse it for temporary roadway pavement structures. When no longer required, dispose of standby material or stockpiled material for temporary roadway pavement structures.

40-4.03D Rapid Strength Concrete

40-4.03D(1) General

Concrete pavement penetration specified in section 90-1.02G(6) does not apply to RSC.

RSC must develop the specified opening age and 7-day modulus of rupture strengths.

40-4.03D(2) Proportioning

Weighing, measuring, and metering devices used for proportioning materials must comply with section 9-1.01.

For batches with a volume of 1 cubic yard or more, proportioning must comply with one of the following methods:

1. Batch the ingredients at a central batch plant and charge them into a mixer truck for transportation to the pour site. Proportion ingredients under section 90-1.02F.

2. Batch the ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a cement silo and weigh system, which must proportion cement for charging into the mixer truck.
3. Batch ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a location where pre-weighed containerized cement is added to the mixer truck. The cement pre-weighing operation must utilize a platform scale. The platform scale must have a maximum capacity of 2.75 tons with a maximum graduation size of 1 pound. Pre-weigh cement into a fabric container. The minimum amount of cement to be proportioned into any single container must be 1/2 of the total amount required for the load of RSC being produced.

For central batch plants, indicators for weighing and measuring systems such as over and under dials must be grouped so that each indicator's smallest increment can be accurately read from the control point of the proportioning operation. In addition, indicators for weighing and measuring cement batched from a remote weighing system must be placed so that each indicator can be accurately read from the control point of the proportioning operation.

Weighing equipment must be insulated from other equipment's vibration or movement. When the plant is operating, each draft's material weight must not vary from the designated weight by more than the specified tolerances. Each scale graduation must be 0.001 of the usable scale capacity.

Aggregate must be weighed cumulatively. Equipment for weighing aggregate must have a zero tolerance of ± 0.5 percent of the aggregate's designated total batch weight. Equipment for the separate weighing of the cement must have a zero tolerance of ± 0.5 percent of the cement's designated individual batch draft. Equipment for measuring water must have a zero tolerance of ± 0.5 percent of the water's designated weight or volume.

The weight indicated for any individual batch of material must not vary from the preselected scale setting by more than:

Batch Weight Tolerances	
Material	Tolerance
Aggregate	± 1.0 percent of designated batch weight
Cement	± 0.5 percent of designated batch weight
Water	± 1.5 percent of designated batch weight or volume

Proportioning consists of dividing the aggregate into the specified sizes and storing them in separate bins, and then combining the aggregate with cement and water. Proportion dry ingredients by weight. Proportion liquid ingredients by weight or volume.

Handle and store aggregates under section 90-1.02F(2). Proportion liquid admixtures under section 90-1.02F(4)(b).

Control aggregate discharged from several bins with gates or mechanical conveyors. The means of discharge from the bins and from the weigh hopper must be interlocked so that no more than 1 bin can discharge at a time, and the weigh hopper cannot be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

At the time of batching, dry and drain aggregates to a stable moisture content. Do not proportion aggregates with visible separation of water from the aggregate during proportioning. At the time of batching, the free moisture content of fine aggregate must not exceed 8 percent of its saturated, surface-dry weight.

If the proportioning plant has separate supplies of the same size group of aggregate with different moisture content, specific gravity, or surface characteristics affecting workability, exhaust 1 supply before using another supply.

Keep cement separated from the aggregate until discharged into the mixer. When discharged into the mixer, cement must be free of lumps and clods. Before reuse, clean fabric containers used for transportation or proportioning of cement.

Weigh systems for proportioning aggregate and cement must be individual and distinct from other weigh systems. Each weigh system must have a hopper, a lever system, and an indicator.

When ordered by the Engineer, determine the gross weight and tare weight of truck mixers on scales designated by the Engineer.

Install and maintain in operating condition an electrically actuated moisture meter. The meter must indicate on a readily visible scale the changes in the fine aggregate moisture content as it is batched. The meter must have a sensitivity of 0.5 percent by weight of the fine aggregate.

Obtain the Engineer's acceptance before mixing water into the concrete during hauling or after arrival at the delivery point. If the Engineer accepts additional water be incorporated into the concrete, the drum must revolve not less than 30 revolutions at mixing speed after the water is added and before starting discharge. Measure water added to the truck mixer at the job site through a meter in compliance with section 9-1.02.

Installation of jointed plain concrete pavement (rapid strength concrete) between the westbound Brookhurst Street on ramp, "BH1" line, and Brookhurst Street off ramp, "BH2" line is to be completed with overnight closures upon completion of stage 1B.

Installation of jointed plain concrete pavement (rapid strength concrete) between the westbound Raymond Avenue on ramp, "RA1" line, and Raymond Avenue off ramp, "RA2" line, is to be completed with overnight closures upon completion of stage 1B.

Installation of jointed plain concrete pavement (rapid strength concrete) between the westbound Euclid Street on ramp, "EU1" line, and Euclid Street off ramp, "EU2" line, is to be completed with overnight closures upon completion of stage 2B.

Installation of jointed plain concrete pavement (rapid strength concrete) adjacent to the westbound State College Boulevard on ramp, "SC1" line, is to be completed with overnight closures upon completion of stage 2B.

40-4.03G Bond Breaker

Not Used

40-4.03H Spreading, Compacting, and Shaping

You may use metal or wood side forms. Wood side forms must not be less than 1-1/2 inches thick. Side forms must be of sufficient rigidity, both in the form and in the connection with adjoining forms, that movement will not occur under forces from subgrading and paving equipment or from the pressure of concrete.

Side forms must remain in place until the pavement edge no longer requires the protection of forms. Clean and oil side forms before each use.

After you deposit the RSC on the subgrade, consolidate RSC with high-frequency internal vibrators. Consolidate adjacent to forms and across the full paving width. Place RSC as nearly as possible to its final position. Do not use vibrators for extensive shifting of RSC.

Spread and shape RSC with powered finishing machines supplemented by hand finishing.

After you mix and place RSC, do not add water to the surface to facilitate finishing. Use surface finishing additives as recommended by the manufacturer of the cement after their use is authorized.

40-4.03I Joints

Before placing RSC against existing concrete, place 1/4-inch thick commercial quality polyethylene flexible foam expansion joint filler across the original transverse and longitudinal joint faces and extend the excavation's full depth. Place the top of the joint filler flush with the top of the pavement. Secure joint filler to the joint face of the existing pavement to prevent the joint filler from moving during the placement of RSC.

40-4.03J Final Finishing

If the Engineer determines by visual inspection the final texturing may not comply with the specifications for coefficient of friction, the Engineer tests to determine coefficient of friction. Open the pavement to traffic and allow 5 days after concrete placement for the Department to test for coefficient of friction. If pavement does not comply with the specifications for coefficient of friction, grind the pavement under section 42-3. Perform grinding before sealing joints.

On ramp termini, use heavy brooming normal to the ramp centerline to produce a coefficient of friction of at least 0.35 determined on the hardened surface under California Test 342.

40-4.03K Curing Method

Use the curing method recommended by the manufacturer of the cement for JPCP (RSC).

40-40.3L Concrete Pavement Removal

When removing and replacing concrete, remove it to full depth and width.

40-4.03M Crack Treatment

Not Used

40-4.03N Removal and Replacement of Slabs Without Bar Reinforcement

For full depth and partial length slab removal, saw cut the full depth and width.

Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and where the Engineer orders. You may make additional saw cuts within the removal area to facilitate slab removal or to prevent binding of the saw cut at the removal area's edge. Saw cut perpendicular to the slab surface.

Use slab lifting equipment with lifting devices that attach to the slab. After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete using dowel bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bars holes from the original dowel bars by 3 inches.

Drill holes and use chemical adhesive to bond the dowel bars to the existing concrete. Use an automated dowel bar drilling machine. Holes must be at least 1/8-inch greater than the dowel bar diameter. Clean the holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry when you place chemical adhesive.

Immediately after inserting dowel bars into the chemical adhesive-filled holes, support the dowel bars and leave them undisturbed for the minimum cure time recommended by the chemical adhesive manufacturer.

Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under section 28-2.03F. For partial slab replacements, place preformed sponge rubber expansion joint filler at new transverse joints in compliance with ASTM D 1752.

40-4.04 MEASUREMENT AND PAYMENT

If the Engineer accepts a test strip and it remains as part of the paving surface, the test strip is measured and paid for as jointed plain concrete pavement (rapid strength concrete), seal pavement joint, and seal isolation joint as the case may be.

The Engineer adjusts payment for jointed plain concrete pavement (rapid strength concrete) in compliance with "Pay Factor Adjustment for Low Modulus of Rupture."

Repair, or removal and replacement of damaged pavement and base is at your expense and will not be measured or paid for.

Providing a facility for and attending the prepaving conference is included in the payment for jointed plain concrete pavement (rapid strength concrete).

Pile location		Conditions
Bridge no.	Support location	
55-0216	Abutment and bents	Caving soils
55-0218	Abutment and bents	Caving soils
55-0245	Abutment and bents	Caving soils
55-0279	Abutment and bents	Caving soils
55-0280	Abutment and bents	Caving soils, high ground water
55-0852	Abutment and bents	Carving soils
Retaining walls 107, 159, 255, 293, 305, 307, and 315		Caving soils

Replace section 49-2.01C(3) with:

49-2.01C(3) Drilling

Oversized drilling is not allowed for casing installation.

Replace "Reserved" in section 49-3.02A(4)(b) with:

Schedule and hold a preconstruction meeting for CIDH concrete pile construction (1) at least 5 business days after submitting the pile installation plan and (2) at least 10 days before the start of CIDH concrete pile construction. You must provide a facility for the meeting.

The meeting must include the Engineer, your representatives, and any subcontractors involved in CIDH concrete pile construction.

The purpose of this meeting is to:

1. Establish contacts and communication protocol between you and your representatives, any subcontractors, and the Engineer
2. Review the construction process, acceptance testing, and anomaly mitigation of CIDH concrete piles

The Engineer will conduct the meeting. Be prepared to discuss the following:

1. Pile placement plan, dry and wet
2. Acceptance testing, including gamma-gamma logging, cross-hole sonic logging, and coring
3. *Pile Design Data Form*
4. Mitigation process
5. Timeline and critical path activities
6. Structural, geotechnical, and corrosion design requirements
7. Future meetings, if necessary, for pile mitigation and pile mitigation plan review
8. Safety requirements, including Cal/OSHA and Tunnel Safety Orders

Add to section 49-3.02A(4)(d)(ii):

If inspection pipes are not shown:

1. Include in the pile installation plan a plan view drawing of the pile showing reinforcement and inspection pipes.
2. Place inspection pipes radially around the pile, inside the outermost spiral or hoop reinforcement and no more than 1 inch clear of the outermost spiral or hoop reinforcement.
3. Place inspection pipes around the pile at a uniform spacing not exceeding 33 inches measured along the circle passing through the centers of inspection pipes. Use at least 2 inspection pipes per pile. Place inspection pipes to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the spacing required herein.
4. Place inspection pipes at least 3 inches clear of the vertical reinforcement. Where the vertical reinforcement configuration does not allow this clearance while achieving radial location

requirements, maximize the distance to vertical rebar while still maintaining the requirement for radial location.

Where the dimensions of the pile reinforcement do not allow inspection pipes to be placed as specified above, submit a request for deviation before fabricating pile reinforcement.

Add to section 49-3.02B(6)(c):

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

Material	Manufacturer
SlurryPro CDP	KB Technologies Ltd. 3648 FM 1960 West, Suite 107 Houston, TX 77068 (800) 525-5237
Super Mud	PDS Company c/o Champion Equipment Company 8140 East Rosecrans Ave. Paramount, CA 90723 (562) 634-8180
Shore Pac GCV	CETCO Drilling Products Group 1350 West Shure Drive Arlington Heights, IL 60004 (847) 392-5800
Terragel or Novagel Polymer	Geo-Tech Drilling Fluids 220 N. Zapata Hwy, Suite 11A Laredo, TX 78043 (210) 587-4758

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

Property	Test	Value
Density During drilling	Mud Weight (density), API 13B-1, section 1	≤ 67.0 pcf ^a
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf ^a
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	50–120 sec/qt
Before final cleaning and immediately before placing concrete		≤ 70 sec/qt
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 13B-1, section 5	≤ 0.5 percent

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

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

SUPER MUD

Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	≤ 64.0 pcf ^a
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf ^a
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	32–60 sec/qt
Before final cleaning and immediately before placing concrete		≤ 60 sec/qt
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 13B-1, section 5	≤ 0.5 percent

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

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

SHORE PAC GCV

Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	≤ 64.0 pcf ^a
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf ^a
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	33–74 sec/qt
Before final cleaning and immediately before placing concrete		≤ 57 sec/qt
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 13B-1, section 5	≤ 0.5 percent

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

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

TERRAGEL OR NOVAGEL POLYMER

Property	Test	Value
Density During drilling	Mud Weight (Density), API 13B-1, section 1	≤ 67.0 pcf ^a
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf ^a
Viscosity During drilling	Marsh Funnel and Cup. API 13B-1, section 2.2	45–104 sec/qt
Before final cleaning and immediately before placing concrete		≤ 104 sec/qt
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 13B-1, section 5	≤ 0.5 percent

^aIf authorized, you may use slurry in salt water. The allowable density of slurry in salt water may be increased by 2 pcf.

Slurry temperature must be at least 40 degrees F when tested.

Add to section 49-3.02C(4):

If the hole is drilled below the specified tip elevation shown, the reinforcement must extend to within 3 inches of the bottom of the drilled hole.

Add to section 49-3.02C(5):

Install permanent steel casings by oscillators, rotators, or by placing in a drilled hole.

55-1.03C(3)(b) Construction

Straighten distorted areas and bends by restraining girders and then alternately heating and cooling the affected region. Maximum heating temperatures are shown in the following table:

Type of heating	Temperature, degrees F, max
Preliminary heating for large areas	800
Spot areas for removing dimples or other localized deformations	800
Vee heats	1,200

Allow heated metal to cool in still air to 600 degrees F. Metal below 600 degrees F must be cooled in still air or by applying dry compressed air.

Replace "Reserved" in section 55-2 with:

55-2.01 GENERAL

55-2.01A Summary

Section 55-2 includes specifications for fitting painted structural steel shells to columns and filling voids with grout.

For field welding of column casings (1) only visual inspection is required and (2) the 2nd sentence of paragraph 3.13.2 and the 1st sentence of paragraph 3.13.3 of AWS D1.5 do not apply.

55-2.01B Definitions

Not Used

55-2.01C Submittals

Submit a painting quality work plan under section 59-2.01C(3).

55-2.01D Quality Control and Assurance

Instead of certification complying with SSPC-QP 1, you may submit documentation showing compliance with section 3 of SSPC-QP 1.

55-2.02 MATERIALS

Steel for casings must comply with ASTM A 36/A 36M or ASTM A 709/A 709M, Grade 36.

Grout must comply with section 50-1.03B(2)(d). For non-circular columns with a minimum gap of 1 inch and a maximum gap greater than 4 inches, extend grout as follows:

1. Use an aggregate consisting of at least 70 percent fine aggregate and approximately 30 percent pea gravel by weight. The size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 90 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
2. Cement content of the grout must be at least 845 pounds per cubic yard.
3. California Test 541 is not required.

Mortar must comply with section 51-1.02F.

Polyethylene must have a compressive strength of at least 10 psi at no more than 15 percent deflection when tested under ASTM D 3575, Test B.

Drain extension pipe must comply with the specifications for drainage piping in section 75-1.03.

55-2.03 CONSTRUCTION

55-2.03A General

Remove and dispose of all material from the space to be occupied by column casing materials.

Bond polyethylene to column surfaces where shown. Use an authorized waterproof adhesive. Apply adhesive to the entire contact surface.

AA

80 FENCES

Add to section 80-3.01A:

Except as otherwise specified in this section, temporary fence (Type CL-6, with privacy screen) must conform to the plan details and the specifications for permanent fence of similar character as provided in section 80-3.

Add to section 80-3.01B:

Temporary fence (Type CL-6, with privacy screen): chain linked fence with privacy screen fabric attached to chain link fabric.

Add to section 80-3.02A:

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

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

Privacy screen fabric must be a commercial quality water resistant knitted polyethylene privacy screening fabric with a reinforced selvage edge. Screening fabric must be of the type that provides a minimum of 88 percent visibility blockage.

Comply with the manufacturer's instructions for attaching privacy screen fabric to chain link fence.

Color of screening fabric must be green.

Add to section 80-3.02B:

Posts may be either metal or wood at your option.

Add to section 80-3.03:

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal fence posts will not be required.

Fence that is damaged during the progress of the work must be repaired or replaced at your expense the same day the damage occurs.

When no longer required for the work, as determined by the Engineer, temporary fence (Type CL-6, with privacy screen) must be removed.

Removed temporary fence (Type CL-6, with privacy screen) materials that are not damaged may be constructed in the permanent work provided the materials conform to the requirements specified for the permanent work and such materials are new when used for the temporary fence.

Holes caused by the removal of temporary fence (Type CL-6, with privacy screen) must be backfilled to comply with section 5-1.36.

83-1.02B(1)(b) Site Preparation

83-1.02B(1)(b)(i) Clearing

Areas to receive vegetation control must be cleared of trash and debris under section 16 and these special provisions.

Vegetation must be removed to the ground. Dispose of cleared trash, debris, and removed vegetation.

83-1.02B(1)(b)(ii) Earthwork

Earthwork must comply with the specifications in section 19 and these special provisions.

After clearing, areas to receive vegetation control must be excavated. Where vegetation control abuts the existing surfacing, the edge of the existing surfacing must be on a neat line or must be cut on a neat line to a minimum depth of 0.17 foot before removing the surfacing. The area to receive vegetation control must be excavated to maintain planned flow lines, slope gradient, and contours of the job site.

After excavation, areas to receive vegetation control must be graded to a smooth, uniform surface and compacted to a relative compaction of not less than 90 percent.

Dispose of surplus excavated material uniformly along the adjacent roadway, except as specified in section 14-11.

83-1.02B(1)(c) Placement

Landscape fabric must be stapled to prevent shifting during concrete placement. Fabric must lie flat, smooth, without bulges or wrinkles, and maintain uniform contact with the soil surface.

Grout must be spread to completely fill voids as shown.

Minor concrete must be struck off and compacted until a layer of mortar has been brought to the surface. Minor concrete must receive a broom finish.

Two weakened plane joints must be constructed in the minor concrete at each post location, perpendicular to the rail and in line with the edge of the grout. The joints must be constructed to a minimum depth of 1 inch by scoring with a tool that will leave the corners rounded and ensure free movement of concrete at the joint.

The finished grade of vegetation control must be uniform; maintaining planned flow lines, slope gradient, and contours of the job site.

83-1.02B(1)(d) Payment

Vegetation control (minor concrete) is measured from the actual areas placed. The Department does not pay for vegetation control (minor concrete) placed outside the dimensions shown.

Replace section 83-1.02C(2) with:

83-1.02C(2) Alternative In-Line Terminal System

Alternative in-line terminal system must be furnished and installed as shown and under these special provisions.

The allowable alternatives for an in-line terminal system must consist of one of the following or a Department-authorized equal.

1. TYPE SKT TERMINAL SYSTEM - Type SKT terminal system must be a SKT 350 sequential kinking terminal manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type SKT terminal system shown. The SKT 350 sequential kinking terminal can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, telephone (801) 785-0505 or from the distributor, Gregory Highway Products, 4100 13th Street, S.W., Canton, OH 44708, telephone (330) 477-4800.

2. TYPE ET TERMINAL SYSTEM - Type ET terminal system must be an ET-2000 PLUS (4-tube system) extruder terminal as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type ET terminal system shown. The ET-2000 PLUS (4-tube system) extruder terminal can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

Submit a certificate of compliance for terminal systems.

Terminal systems must be installed under the manufacturer's installation instructions and these specifications. Each terminal system installed must be identified by painting the type of terminal system in neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

For Type ET terminal system, the steel foundation tubes with soil plates attached must be, at your option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. The wood terminal posts must be inserted into the steel foundation tubes by hand and must not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For Type SKT terminal system, the soil tubes must be, at your option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. Wood posts must be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

After installing the terminal system, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

Replace section 83-1.02C(3) with:

83-1.02C(3) Alternative Flared Terminal System

Alternative flared terminal system must be furnished and installed as shown and under these special provisions.

The allowable alternatives for a flared terminal system must consist of one of the following or a Department-authorized equal.

1. TYPE FLEAT TERMINAL SYSTEM - Type FLEAT terminal system must be a Flared Energy Absorbing Terminal 350 manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type FLEAT terminal system shown. The Flared Energy Absorbing Terminal 350 can be obtained from the distributor, Universal Industrial Sales, P.O. Box 699, Pleasant Grove, UT 84062, telephone (801) 785-0505 or from the distributor, Gregory Industries, Inc., 4100 13th Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
2. TYPE SRT TERMINAL SYSTEM - Type SRT terminal system must be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type SRT terminal system shown. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

Submit a certificate of compliance for terminal systems.

Terminal systems must be installed under the manufacturer's installation instructions and these specifications. Each terminal system installed must be identified by painting the type of terminal system in

neat black letters and figures 2 inches high on the backside of the rail element between system posts numbers 4 and 5.

For Type SRT terminal system, the steel foundation tubes with soil plates attached must be, at your option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. The wood terminal posts must be inserted into the steel foundation tubes by hand and must not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For Type FLEAT terminal system, the soil tubes must be, at your option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes must be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer must be moistened and thoroughly compacted. Wood posts must be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts must be coated with a grease that will not melt or run at a temperature of 149 degrees F or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

After installing the terminal system, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

Add to section 83-2.02D(1):

Where shown, construct concrete barriers on a layer of Class 2 aggregate base. Aggregate base must comply with section 26. Adjust the height of the barriers to allow for irregularities in the surface of the finished aggregate base. The adjustment amount will be ordered before the concrete is placed.

Add to section 83-2.02D(3):

Install barrier markers at 48 foot intervals on the various Type 60 concrete barriers shown.

Replace section 83-2.02E(3) with:

83-2.02E(3) Type ADIEM Crash Cushion

Type ADIEM crash cushion must be installed where shown.

Type ADIEM crash cushion must be an ADIEM-350 as manufactured by Trinity Highway Products, LLC, and must include the items shown for the crash cushion.

The successful bidder can obtain the crash cushion from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

The price quoted by the manufacturer for the crash cushion, FOB Centerville, Utah is \$13,000 not including sales tax.

The above price will be firm for orders placed on or before 12/31/2012, provided delivery is accepted within 90 days after the order is placed.

Submit a copy of the manufacturer's plan and parts list as an informational submittal.

Submit a certificate of compliance for Type ADIEM crash cushion.

Install the crash cushion under the manufacturer's installation instructions.

After installing the Type ADIEM crash cushion and backup, dispose of surplus excavated material in a uniform manner along the adjacent roadway where designated by the Engineer.

Replace section 83-2.02E(4) with:

83-2.02E(4) Type REACT Crash Cushion

Type REACT crash cushion must be installed where shown.

Type REACT crash cushion and additional components must comply with the descriptions shown in the following table:

Bid item description	Manufacturer's product description
Type REACT 9CBB crash cushion	REACT 350-36 concrete side mount

The successful bidder can obtain from the following distributors the Type REACT crash cushion manufactured by Energy Absorption Systems, Inc. at 35 East Wacker Drive, Suite 1100, Chicago, IL 60601-2076:

1. Northern California: Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, telephone (916) 387-9733, FAX (916) 387-9734
2. Southern California: Traffic Control Service, Inc., 1818 E. Orangethorpe, Fullerton, CA 92831-5324, telephone (714) 526-9500, FAX (714) 526-9561

The price quoted by the manufacturer for Type REACT 9CBB crash cushion, FOB Pell City, Alabama is \$34,365, not including sales tax.

The above prices will be firm for orders placed within 30 days of Contract award, and provided delivery is accepted within 90 days after the order is placed.

The price quoted for Type REACT 9CBB crash cushion includes the concrete anchorage devices, but does not include the concrete anchor slab or the concrete backup block.

Install the crash cushion under the manufacturer's instructions.

Concrete anchorage devices used for attaching the crash cushion to the base slab must be limited to those that have been provided by the manufacturer.

The concrete anchor slab and backup block must comply with sections 51 and 52.

The concrete anchor slab and backup block must be constructed of concrete containing not less than 590 pounds of cementitious material per cubic yard.

Submit a copy of the manufacturer's plan and parts list, for each model installed, as an informational submittal.

Submit a certificate of compliance for each model of Type REACT crash cushion.

Payment for structure excavation, structure backfill, and concrete anchor slab and backup block with bar reinforcing steel is included in the payment for crash cushion (REACT 9CBB).

Add to section 83-2.03:

Concrete barrier (Type 736A modified), concrete barrier Type 736A (Mod), and concrete barrier (Type 736B modified) are paid for as concrete barrier (Type 736 modified).

Concrete barrier (Type 736A) and concrete barrier (Type 736B) are paid for as concrete barrier (Type 736).

Concrete barrier (Type 736S) and concrete barrier (Type 736SV modified) are paid for as concrete barrier (Type 736SV).

Concrete barrier (Type 742 modified) and concrete barrier (Type 742A modified) are paid for as concrete barrier (Type 742).

Add to the 4th paragraph of section 86-1.03:

13. Fiber Optic Cable

Replace the 3rd paragraph of section 86-1.06A with:

Traffic signal system, ramp metering or surveillance controller shutdowns are limited to periods between the hours of 9:00 a.m. and 3:00 p.m. , Monday through Friday.

Replace "Reserved" in section 86-1.06B with:

Traffic Management System (TMS) elements include, but are not limited to ramp metering (RM) system, communication system, traffic monitoring stations, video image vehicle detection system (VIVDS), microwave vehicle detection system (MVDS), loop detection system, changeable message sign (CMS) system, extinguishable message sign (EMS) system, highway advisory radio (HAR) system, closed circuit television (CCTV) camera system, roadway weather information system (RWIS), visibility sensor, and fiber optic system.

Existing TMS elements, including detection systems, shown and located within the project limits must remain in place and be protected from damage. If the construction activities require existing TMS elements to be nonoperational or off line, and if temporary or portable TMS elements are not shown, you must provide for temporary or portable TMS elements. You must receive authorization on the type of temporary or portable TMS elements and installation method.

Before work is performed, the Engineer, you, and the Department's Traffic Operations Electrical representatives must jointly conduct a pre-construction operational status check of all existing TMS elements and each element's communication status with the Traffic Management Center (TMC), including existing TMS elements not shown and elements that may not be impacted by your activities. The Department's Traffic Operations Electrical representatives will certify the TMS elements' location and status, and provide a copy of the certified list of the existing TMS elements within the project limits to you. The status list will include the operational, defined as having full functionality, and the nonoperational components.

You must obtain authorization at least 72 hours before interrupting existing TMS elements' communication with the TMC that will result in the elements being nonoperational or off line. You must notify the Engineer at least 72 hours before starting excavation activities.

Traffic monitoring stations and their associated communication systems, which were verified to be operational during the pre-construction operational status check, must remain operational on freeway/highway mainline at all times, except:

1. For a duration of up to 15 days on any continuous segment of the freeway/highway longer than 3 miles
2. For a duration of up to 60 days on any continuous segment of the freeway/highway shorter than 3 miles

If the construction activities require existing detection systems to be nonoperational or off line for a longer time period or the spacing between traffic monitoring stations is more than the specified criteria above, and temporary or portable detection operations are not shown, you must provide provisions for temporary or portable detection operations. You must receive authorization on the type of detection and installation before installing the temporary or portable detection.

If existing TMS elements shown or identified during the pre-construction operational status check, except traffic monitoring stations, are damaged or fail due to your activity, where the elements are not fully functional, the Engineer must be notified immediately. If you are notified that existing TMS elements have been damaged, have failed or are not fully functional due to your activity, the damaged or failed TMS elements, excluding structure-related elements, must be repaired or replaced, at your expense, within 24 hours. For a structure-related elements, you must install temporary or portable TMS elements within 24 hours. For nonstructure-related TMS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.

If fiber optic cables are damaged due to your activities, you must install new fiber optic cables from an original splice point or termination to an original splice point or termination, unless otherwise authorized. Fiber optic cable must be spliced at the splice vaults if available. The amount of new fiber optic cable slack in splice vaults and the number of new fiber optic cable splices must be equivalent to the amount of slack and number of splices existing before the damage or as directed by the Engineer. Fusion splicing will be required.

You must demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment. If you fail to perform required repairs or replacement work, the Department may perform the repair or replacement work and the cost will be deducted from monies due to you.

A TMS element must be considered nonoperational or off line for the duration of time that active communications with the TMC is disrupted, resulting in messages and commands not transmitted from or to the TMS element.

You must provide provisions for replacing existing TMS elements within the project limits, including detection systems, that were not identified or during the pre-construction operational status check that became damaged due to your activities.

If the pre-construction operational status check identified existing TMS elements, then you, the Engineer, and the Department's Traffic Operations Electrical representatives must jointly conduct a post construction operational status check of all existing TMS elements and each element's communication status with the TMC. The Department's Traffic Operations Electrical representatives will certify the TMS elements' status and provide a copy of the certified list of the existing TMS elements within the project limits to you. The status list will include the operational, defined as having full functionality, and the nonoperational components. TMS elements that cease to be functional between pre and post construction status checks must be repaired at your expense.

The Engineer will authorize the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements must be new and of equal or better quality than the existing TMS elements.

If no electrical work exists on the project and no TMS elements are identified within the project limits, the pre-construction operational status check is change order work.

Furnishing and installing temporary or portable TMS elements that are not shown, but are required when an existing TMS element becomes nonoperational or off line due to construction activities, is change order work.

Furnishing and installing temporary or portable TMS elements and replacing TMS elements that are not shown nor identified during the pre-construction operational status check and were damaged by construction activities is change order work.

If you are required to submit provisions for the replacement of TMS elements that were not identified, submitting the provisions is change order work.

Add to section 86-2.03B:

Use sleeve nuts on Type 1-A standards. The bottom of the base plate must be flush with finished grade.

Add to section 86-2.04A:

The sign mounting hardware must be installed at the locations shown.

Install non-illuminated street name signs on signal mast arms using a minimum 3/4 by 0.020-inch round edge stainless steel strap and saddle bracket. Wrap the strap at least twice around the mast arm, tighten, and secure with a 3/4-inch stainless strap seal. Level the sign panel and tighten the hardware securely.

Set the Type 1 standards with the handhole on the downstream side of the pole in relation to traffic or as shown.

Add to section 86-2.05A:

Conduit installed underground must be Type 1 or Type 3.

Add to section 86-2.05B:

The conduit in a foundation and between a foundation and the nearest pull box must be Type 1.

Add to section 86-2.05C:

If a standard coupling cannot be used for joining Type 1 conduit, use a UL-listed threaded union coupling under section 86-2.05C, a concrete-tight split coupling, or a concrete-tight set screw coupling.

If Type 3 conduit is placed in a trench, not in the pavement or under concrete sidewalk, after the bedding material is placed and the conduit is installed, backfill the trench to not less than 4 inches above the conduit with minor concrete under section 90-2, except the concrete must contain not less than 421 pounds of cementitious material per cubic yard. Backfill the remaining trench to finished grade with backfill material.

After conductors have been installed, the ends of the conduits terminating in pull boxes, service equipment enclosures, and controller cabinets must be sealed with an authorized type of sealing compound.

At those locations where conduit is required to be installed under pavement and underground facilities designated as high priority subsurface installation under Govt Code § 4216 et seq. exist, conduit must be placed by the trenching in pavement method under section 86-2.05C.

The final 2 feet of conduit entering a pull box in a reinforced concrete structure may be Type 4.

Delete items 2–5 in the list in the 2nd paragraph of section 86-2.06A(2).

Add to section 86-2.06A(2):

Do not place grout in the bottom of the pull box.

Replace "Reserved" in section 86-2.06B of the RSS for section 86-2.06 with:

86-2.06B(1) General

86-2.06B(1)(a) Summary

This work includes installing non-traffic-rated pull boxes.

86-2.06B(1)(b) Submittals

Before shipping pull boxes to the jobsite, submit a list of materials, Contract number, pull box manufacturer, manufacturer's instructions for pull box installation, and your contact information to METS.

Submit reports for pull box from an NRTL-accredited lab.

86-2.06B(1)(c) Quality Control and Assurance

86-2.06B(1)(c)(i) General

Pull boxes may be tested by the Department. Deliver pull boxes and covers to METS and allow 30 days for testing. When testing is complete, you will be notified. You must pick up the boxes and covers from the test site and deliver it to the job site.

Any failure of the pull box or the cover that renders the unit noncompliant with these specifications will be a cause for rejection. If the unit is rejected, you must allow 30 days for retesting. Retesting period starts when the replacement pull box is delivered to the test site. You must pay for all retesting costs. Delays resulting from the submittal of noncompliant materials does not relieve you from executing the Contract within the allotted time.

If the pull box submitted for testing does not comply with the specifications, remove the unit from the test site within 5 business days after notification that it is rejected. If the unit is not removed within that period, it may be shipped to you at your expense.

You must pay for all shipping, handling, and transportation costs related to the testing and retesting.

86-2.06B(1)(c)(ii) Functional Testing

The pull box and cover must be tested under ANSI/SCTE 77, "Specifications for Underground Enclosure Integrity."

86-2.06B(1)(c)(iii) Warranty

Provide a 2-year manufacturer replacement warranty for pull box and cover from the date of installation of the pull box and cover. All warranty documentation must be submitted before installation.

Replacement parts must be provided within 5 business days after receipt of failed pull box, cover, or both at no cost to the Department and must be delivered to the Department's Maintenance Electrical Shop at 1808 N. Batavia, Orange, CA 92865.

86-2.06B(2) Materials

The pull box and cover must comply with ANSI/SCTE 77, "Specifications for Underground Enclosure Integrity," for Tier 22 load rating and must be gray or brown in color.

Each pull box cover must have an electronic marker cast inside.

Extension for the pull box must be of the same material as the pull box and attached to the pull box to maintain the minimum combined depths as shown.

Include recesses for a hanger if a transformer or other device must be placed in a pull box.

The bolts, nuts, and washers must be a captive bolt design.

The captive bolt design must be capable of withstanding a torque range of 55 to 60 ft-lb and a minimum pull out strength of 750 lb. Perform the test with the cover in place and the bolts torqued. The pull box and cover must not be damaged while performing the test to the minimum pull out strength.

Stainless steel hardware must have an 18 percent chromium content and an 8 percent nickel content.

Galvanize ferrous metal parts under section 75-1-.05.

Manufacturer's instructions must provide guidance on:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below Tier 22 load rating
2. Where side entries cannot be made
3. Acceptable method to be used to create the entry

Tier 22 load rating must be labeled or stenciled by the manufacturer on the inside and outside of the pull box and on the underside of the cover.

86-2.06B(3) Construction

Do not install pull box in curb ramps or driveways.

A pull box for a post or a pole standard must be located within 5 feet of the standard. Place a pull box adjacent to the back of the curb or edge of the shoulder. If this is impractical, place the pull box in a suitable, protected, and accessible location.

Add to section 86-2.08A:

Wrap conductors around the projecting end of conduit in pull boxes as shown. Secure conductors and cables to the projecting end of the conduit in pull boxes.

Replace the 1st sentence of the 1st paragraph of section 86-2.08E with:

Signal interconnect cable must be the 12-pair type with stranded tinned copper no. 20 conductors.

Add to Section 86-2.14

86-2.14D System Testing and Documentation

86-2.14D(1) General

System testing and documentation covers the integration testing (video and data) which is required to validate the operational performance of the communication system.

86-2.14D(1)(a) Submittals

86-2.14D(1)(a)(i) System Documentation

You must submit a draft copy of all documentation for review and approval before production of documentation. The Engineer will review and approve or reject the draft documentation within 4 weeks of receipt.

You must modify the documentation if required and submit provisional documentation. The Engineer will approve or reject the provisional documentation within 3 weeks of receipt. You must arrange for re-submission in a timely manner to meet the schedule in case the documents are rejected.

Draft documentation must be submitted eight weeks before the start of installation. The draft documentation must show the general approach in preparing the final manuals.

Upon approval of the draft documentation, provisional documentation must be supplied 3 weeks before the start of site testing. The provisional documentation must be of the same format as the final manuals but with temporary insertion for items which cannot be finalized until the system is completed, tested and accepted.

Final documentation must be submitted no later than 4 weeks after completion of the acceptance tests and must incorporate all comments made during the approval stages. You will be responsible for all delays caused by non-compliance to the specified requirements.

Final documentation must be approved before its production.

Ten copies of all final documents must be delivered. The copies must be 8 ½" x 11" and bound in three-ring, hard-covered binders, complete with dividers.

Documentation must consist of the following types of manuals and drawings and must include the information described.

1. System Description and Technical Data
 - 1.1. The system description and technical data section must contain an overall description of the system and associated equipment and cables with illustrative block diagrams.
 - 1.2. This section must identify all equipment and cables in the system stating the exact module and option number that are employed in the system. Technical data, specification and settings for every type of equipment or cable must be provided. Any modification that has been done on the equipment must be clearly described.
2. Configuration of Hardware and Software Documentation
 - 2.1. Provide proper documentation for all configuration of hardware and software. The configuration of hardware and software documentation must include a clear description of the system's functionalities and specifications. Description on each configuration of hardware and software modules and programs must be provided.

3. Operations
 - 3.1. Describe how to operate the system and each particular type of equipment and software. Equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate the system and each functional unit must be provided.
 - 3.2. Procedures must also be provided for initial tune-up of the system and adjustment and checkout required to ensure that the system is functioning within the performance requirements. Warning of special procedures must be given. The functions and setting of all parameters must be explained.
4. Corrective Maintenance
 - 4.1. Include fault diagnostic and repair procedures to permit locating and correcting faults at the replaceable module level. Procedures must include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.
5. Preventative Maintenance
 - 5.1. Include procedures for preventative maintenance in order to maintain the performance parameters of the system, equipment and cables within the requirements of the specifications.
6. Test Results
 - 6.1. The test result section of the operations and maintenance must include a copy of the results for all the tests that have been conducted by you.
 - 6.2. System schematic drawings must be provided to identify the type of equipment at each location and the function of all equipment. The drawings must also show how the system is interconnected. A comprehensive list of cabling and wiring must be provided to clearly identify the interconnection and labeling of all equipment both in the field, at existing cable node, at existing hub, and at the TMC.

86-2.14D(1)(b) Quality Control and Assurance

86-2.14D(1)(b)(i) Subsystem Testing

You must test all material, equipment and cable after installation before acceptance tests. These tests must comply with the "Performance Testing" sub-sections for each individual item where applicable.

You must supply all test equipment required.

You must submit an installation and test plan which details the method of installation and site testing for all material, equipment, and cable and the associated schedule of activities. Five copies of the installation and test plan must be submitted for approval, at least 2 weeks before proposed testing dates.

The equipment and hardware must be installed in accordance with the plans and special provisions. All material, equipment and cable must be tested upon delivery and after installation at the site. Tests and inspections must include:

1. Visual inspection for damaged or incorrect installation.
2. Adjustments and alignment.
3. Measurement of parameters and operating conditions.

These tests must be performed in accordance with the approved installation and test plan.

You must notify the Engineer of your intent to proceed with installation and testing 48 hours before commencement of each test.

Installation documentation and test results must be provided for all material, equipment and cable before submission of the acceptance test plan and commencement of acceptance tests. The documentation must be in accordance with the contract and must include the following as appropriate:

1. Model and part number for all material
2. Test equipment model number, serial number, settings, and date of last calibration
3. All strap and switch settings
4. Record of all adjustments and levels
5. Alignment measurements
6. Identification of interconnections
7. All factory, laboratory and site test results

86-2.14D(1)(b)(i)a Physical Inspection

You must provide documentation to prove delivery of all material, equipment, cable and documentation. If any material or documentation is outstanding or have been replaced under pre-acceptance warranty a physical inspection and documentation must be provided for this material. The physical inspection must consist of inspecting all installed material to ensure workmanship satisfies the specified requirements.

86-2.14D(1)(b)(ii) Video Link Testing

1. Between each video node field cabinet and corresponding field camera sites.
2. Between Transportation Management Center (I-5/Sand Canyon) and corresponding field camera sites.

The video link testing must be conducted after you submit a test plan and receives approval, based on these special provisions, plans and the manufacturer's recommended test procedures for the equipment involved. Measurements must be made from the baseband-in (output of camera control receiver) to baseband-out connections.

A video communication link must include a video transmitter, video receiver, interconnecting optical fiber, connectors and power supplies. The video link is to provide point-to-point transmission and reception of a full motion National Television System Committee (NTSC) baseband video signal using an optical fiber as the transmission medium. Video system performance tests for any particular video link must be performed after the associated camera has been installed and tested.

Each video link in the communication system must be tested with a video test signal at the transmitter input. You must perform all level adjustments and alignments required on the video link in order for it to operate in accordance with these special provisions. If any video link fails to meet the performance requirements, you must take all steps necessary to restore the failed link to the required performance.

Each video link in the communication system must be tested for qualitative performance with its associated camera turned on and connected to the BNC connector of the video link transmitter. You must measure and record the received optical power at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL (average picture level) flat field input to the transmitter.

You must measure, record and tabulate the receiver's dynamic range at the optical connector of the video receiver from the video transmitter under test using a 90 percent APL (average picture level) flat field input to the transmitter.

For all tests required under dynamic range at the optical connector, the measured optical attenuation of the fiber being used must be increased to the point at which the video test set just begins to show a 3 dB degradation of the video signal to noise ratio in accordance with TIA-250 video test procedures. The optical receive power into the video receiver must be measured and recorded. Then the optical attenuation must be decreased until the video test set once again shows degradation of the video and registers errors.

The output video signal must be connected to a monitor. The observed picture on the monitor will be assessed for qualitative performance.

You must measure, record and tabulate the receiver's dynamic range at the optical connector of the video decoder from the video encoder under test.

The optical power into the receiver exceed the manufacturer's specified saturation level. These minimum and maximum receive levels define the video decoder's dynamic range and must meet or exceed the specifications as specified elsewhere under these special provisions.

Each video link must be tested for the following performance characteristics. You must measure, record and demonstrate that the performance meets or exceeds the specified TIA-250 medium haul requirements listed below:

1. Differential gain
2. Differential phase
3. Chrominance to luminance delay inequality
4. Frequency response characteristic

5. Signal to noise ratio
6. Signal to low frequency noise
7. Signal-to-periodic-noise
8. Output signal level

86-2.14D(1)(b)(iii) Data Link Testing

Records of tests must be delivered. End-to-end bit error rate tests (BERTS) must be conducted using the type modem to be employed on the link at the bit rate to be employed. The BERTS must be with the modem at the equipment sites configured in a loop back and with the test setup at the node. The BERTS must be a minimum of 3 hours for each circuit, including required bridges. Circuits affected by your work must provide an error rate less than 1×10^{-6} .

Data link testing for the alignment and testing of data systems must be conducted after you submit a test plan and receives approval, based on these special provisions, plans and the manufacturer's recommended test procedures for the equipment involved. The activities must include verification of data circuits in the low speed data links, high speed data ring network and in the integrated data system. You must adjust levels required for the data system to operate.

You must test the following data links:

1. Between each data node field cabinet and the corresponding field elements.
2. Between the TMC (Transportation Management Center) (I-5/Sand Canyon) and the corresponding field elements.
3. Between Data Node 6 (SR-91/Brookhurst St) and corresponding field elements.
4. Between Hub 2 (SR-91/SR-55) and corresponding field elements.

A 15 minute BERT must be performed between each drop of each circuit at 9600 baud.

86-2.14D(1)(b)(iv) Acceptance Testing

Acceptance testing includes the preparation of an acceptance test plan, conducting acceptance tests and subsequent retests, and documentation of the results.

Final acceptance tests must be conducted after the site test results have been reviewed and accepted. These tests include the complete system in normal operations.

You must submit 5 copies of the acceptance test plan for approval before commencement of acceptance testing. The acceptance test plan must address the full testing requirements of the specifications.

The acceptance test plan must detail all tests to be performed, the test results which are expected and the test schedule. The acceptance test plan will include the following major test and acceptance categories:

1. Successful acceptance of Subsystem testing
2. Performance tests after connecting the system.
3. Functional tests after connecting the system.

The model and part numbers and date of last calibration of all test equipment must be included with the test results.

Acceptance testing must not commence until all material required is delivered, installed, and aligned and all production test and site test documentation and results have been approved.

All acceptance test results must be fully documented and such documentation provided as a condition of acceptance.

86-2.14D(1)(c) Performance Tests

You must conduct operational performance tests on the following:

1. All video links from the camera output to the input of the color monitors in the TMC.
2. All data circuits operational from the TMC to the field equipment.

Video tests must satisfy the end-to-end performance requirements under normal operating conditions. Video tests must be measured with the video test equipment injecting a test signal in place of the camera output in the field, as appropriate,

You must conduct operational performance tests on the following:

You must test the video subsystem and record the results:

1. The video signal to noise must be measured according to TIA-250. The video signal to noise ratio must be measured and recorded with suitable video test equipment providing the video reference signal. The video signal to noise ratio must be greater than 47 dB.
2. The video signal to low frequency noise ratio must be measured according to TIA-250. The resulting video signal to low frequency noise ratio must be greater than 39 dB. If a Automatic Gain Control (AGC) circuit does not allow measurement as per TIA-250, you must submit an alternative test plan for approval.
3. The video signal to periodic noise ratio must be measured according to TIA-250. The resulting video signal to periodic noise ratio must be greater than 52 dB.
4. Data tests must be performed on all operational data circuits. The central computer and the controller in the field must be temporarily disconnected from the circuit under test for the connection of appropriate test equipment for the measurement of the following parameters:
 - 4.1 A data test set must be used at the remote modems to insert an asynchronous pseudo-random pattern using 8 data bits, 1 start bit, 1 stop bit and even parity. The data test set at the remote modem must hold Ready to send (RTS) high for the duration of the data test. The data rate of the test sets must be set to the rate used in the system.
 - 4.2. A 15 minute test on each drop of each multipoint circuit must have an average bit error rate in both directions less than 5×10^{-8} .
 - 4.3. The round-trip propagation delay for each Model 170 controller circuit must be measured by using a loopback connector on the slave modem furthest from the master. The loopback connector must connect pin 2 to 3, 8 to 4, and 6 to 20 of the DB-25 connector. A data test set capable of measuring delay must be used at the TMC. The test must be repeated 3 times and the average value calculated.
 - 4.4. Pulse-width distortion must be defined as the difference between the data pulse width into a data channel port at the TMC port and the pulse width out of the TIA-232 port of an interconnected drop modem.
 - 4.5. Distortion must be tested between the TMC and the selected field modem for each data circuit. The signal must not have a gross start-stop distortion greater than 20 percent at any data interface, measured as per TIA-404-A.
 - 4.6. If any circuit or element fails to satisfy the specified performance requirements, you must determine the cause and remedy the failure to the satisfaction of the Engineer. The full performance tests must be repeated under operating conditions as determined by the Engineer.

86-2.14D(1)(d) Functional Tests

You must test in the presence of the Engineer all integrated system functions to demonstrate that all circuits, cameras, camera control, and all equipment satisfies the functional requirements of the specifications.

Functional testing must include subjective testing of each camera image and verification of camera control from the camera control unit. The connectivity of each data channel must be demonstrated.

You must document all functional test results.

In the event that any aspect of the functional tests is determined by the Engineer to have failed, you must cease all acceptance testing and determine the cause of the failure. If the failure is due to a defect within your furnished portion of the system, You must make repairs to satisfaction. Acceptance testing must, at the discretion of the Engineer, be repeated from the start of functional tests.

86-2.14D(1)(e) Final Acceptance

The system will not be accepted until all of the following conditions have been met as follows:

1. Physical, performance, and functional acceptance tests have been completed and the results are approved.
2. All documentation has been completed and submitted.
3. All connections that were changed to perform acceptance tests are restored and tested.

Upon completion of acceptance tests you must connect all equipment to form a fully operational system.

86-2.14D(2) Materials

Not Used

86-2.14D(3) Construction

Not Used

86-2.14D(4) Payment

Not Used

Replace Section 86-2.17 with:

86-2.17 CLOSED CIRCUIT TELEVISION SYSTEM

86-2.17A General

Section 86-2.17 includes specifications for installing foundation, pole, multiconductor cable and connectors for connecting to the relocated existing closed circuit television (CCTV) cabinet as shown on the plans and testing CCTV system after relocation.

You must arrange a technician, qualified to work on the CCTV system present at the time the equipment is turned on.

The CCTV relocation incorporates the following items into an operational system:

1. Relocated Type 334-TV cabinet with:
 - 1.1. FDU
 - 1.2. Fiber optic data modem
 - 1.3. Video transmitter
2. Relocated CCTV assembly
3. Junction box.
4. New overhead sign mounted camera pole
5. New multiconductor cable from CCTV assembly to Type 334-TV cabinet

The existing CCTV operation and communication with Caltrans District 12 TMC must be maintained at all times except for actual duration of the time the CCTV is relocated, or unless approved.

The relocation of the existing CCTV must not commence until the new CCTV foundation, the electrical service and communication service are connected and available to bring the CCTV operational.

86-2.17B Closed Circuit Television System Restrictions

You must carry out CCTV cutover subject to the following restrictions:

1. No CCTV controller must be disconnected from AC power without prior written approval.
2. You must obtain approval, not less than 2 working days before any testing, disconnection or disruption of services from any CCTV.

86-2.17C Type 334-TV Cabinet (Relocated)

Relocate Type 334-TV cabinet from existing location to new location as shown. Foundation for relocated Type 334-TV cabinet must conform to the details on Standard Plan ES-3C for Model 332L and 334L Cabinets.

Terminate new fiber optic drop cable in existing FDU. Complete all interface cable connections between CCTV assembly junction box and cabinet.

All relocated cabinet assemblies must be tested to demonstrate the correct function of all controls in the presence of the Engineer.

86-2.17D Closed Circuit Television CCTV Assembly (Relocated)

Relocate CCTV assembly from existing location to new location as shown. You must relocate the CCTV assembly consisting of the following three components:

1. Camera with integral motorized zoom lens.
2. Environmental enclosure with sun shroud.
3. Pan/tilt positioner with integrated receiver/driver unit.

86-2.17E Multi Conductor Cable

The video/control/power cables include, one 3 pair No. 22 AWG (3P22), one 5 pair No. 26 AWG (5P26) shielded twisted pair cables, and a flexible 75 Ω coaxial cable to connect the camera assembly to AC power source, fiber optic data modem and video transmitter units.

The coaxial cable RG174/U must be compatible with the existing system. Appropriate connectors for interconnect wiring and the video/control/power cables must be furnished and installed in accordance with manufacturer's recommended procedures.

The 3P22 cable must consist of 6 tinned standard conductor (7x26) of high conductivity No. 22 AWG copper conductor with numbered PVC insulated nylon overcoat insulation. The cable outer jacket must have 0.063-inch minimum thickness, the conductor insulation must be a minimum 0.016-inch PVC and 0.005-inch nylon in thickness. The overall cable thickness must not exceed 0.63-inch. The 3P22 must be used to supply power to the camera and pan/tilt unit.

The 5P26 cable must consist of 10 tinned stranded conductor (7x26) of high conductivity No. 26 AWG copper conductor with numbered PVC insulated nylon overcoat insulation. The cable outer jacket must have a minimum thickness of 0.063-inch. The individual conductors' insulation must have a minimum of 0.016-inch PVC and 0.005-inch nylon in thickness. The overall cable thickness must not exceed 0.83-inch. The 5P26 must be used for camera and lens control functions.

The 3P22 and 5P26 cables must be rated at 300 V at 194°F. The cable jacket must be marked with the manufacturer's name and part number, the insulation type designation, voltage and temperature ratings. The cable must have the mechanical strength to support at least 100 vertical feet of its own weight.

All 115 VAC carrying conductors must be from the 3P22 cable. Interconnect wiring and connectors must be supplied and installed to make the CCTV system completely operational.

Specifications of all cable assemblies, including connectors with strain relief backshells, must be submitted as part of the shop drawings for review and approval.

Continuous wiring must be installed from source to destination. No splices must be allowed. Coaxial cables must be installed without damaging the conductors, insulation, or jacket. The coaxial cables must not be kinked; the manufacturer's recommended bending radius must be maintained.

The main connector must be equivalent to AMP 206037-1 with AMP 206070-1 back shell and AMP 66584-4 socket pins.

Provide a solid No. 8 AWG ground wire between the camera assembly and the CCTV cabinet ground rod.

Install CCTV pole of the type as shown.

86-2.17F CCTV Assembly Documentation

You must be responsible for all testing and documentation required for approval and acceptance of the production, installation, and operation of these materials and equipment. The following identifies the specific quality control requirements for testing and documentation:

1. You must test all cables after installation with connectors attached for continuity and shorts or grounds.
2. You must adjust and set limit stops to the pan/tilt unit at each camera site to prevent the view of the areas outside of the roadway system. The final settings must be approved

3. You must perform a local functional test at each of the CCTV locations; and must demonstrate all the CCTV features. You must provide all the test equipments to perform these tests.

Replace section 86-2.18 with:

86-2.18 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

Add to Section 86-2:

86-2.19 TEMPORARY COMMUNICATION SYSTEM

86-2.19A General

Section 86-2.19 includes specifications for the installation, relocating, and removal of temporary communication system.

86-2.19A(1) Fiber Optic Cable System

Install, integrate, test, and remove temporary fiber optic cables as shown.

86-2.19B Temporary General Packet Radio Service Equipment

86-2.19B(1) General

The temporary general packet radio service (GPRS) equipment must provide and maintain wireless data transmission between the field units and the Transportation Management Center (TMC) during construction. The temporary GPRS equipment must consist of a GPRS modem, power strip, serial cable, GPRS antenna and antenna cable. The modem must be a product certified by AT&T, the existing telecommunication service provider.

This temporary equipment must be installed as shown and must be capable of interacting with the Model 170 controller located inside the controller cabinet. You must secure all components and cables to the rack or cabinet as necessary. The installed temporary GPRS equipment must provide communication with the existing telecommunications service provider's GPRS/EDGE (Enhanced Data rates for Global system for mobile communications Evolution) system currently being used in the District. You must provide software, cabling and configure the temporary GPRS modem for connection to the existing wireless telecommunications provider's GPRS system. You must provide and maintain complete data reliability for the duration of the project.

You must install, integrate, test and remove all equipment and components necessary to provide the temporary GPRS system during construction.

86-2.19C General Packet Radio Service Modem

86-2.19C(1) General

Not Used

86-2.19C(1)(a) Summary

Install the general packet radio system (GPRS) modem at the controller cabinets as shown.

The GPRS modem shall be configured with the following major components:

1. Modem
2. Power supply
3. Modem mounting bracket and hardware
4. Serial communication cable – Type D
5. Antenna

86-2.19C(1)(b) Definitions

86-2.19C(1)(b)(i) Acronyms

APN - Access Point Name

IMEI - International Mobile Equipment Identification

IP - Internet Protocol

PCCA - Portable Computer and Communications Association

PDP - Packet Data Protocol

PPP - Point to Point Protocol

SIM - Subscriber Identity Module

TCP - Transmission Control Protocol

UDP - User Datagram Protocol

86-2.19C(2) Materials

86-2.19.C(2)(a) Modem

All modems shall be configurable remotely through the wireless network and through the modem serial port. You must configure all modems before acceptance. You must provide the modem serial, SIM and IMEI numbers 30 days before requiring the PDP context. The Engineer will make available the PDP context comprising the IP (assigned) and APN (obtained from service provider). All modems shall be complete with all cables, conductors, hardware, antenna and other equipment as required to make the system completely operational. Location and mounting of the equipment shall be as shown and as directed by the Engineer. The modems shall be fully compliant with PCCA STD-101.

86-2.19C(2)(a)(i) Environmental Requirements

The operating temperature of the modem shall range from -30to +70 degrees C, with humidity from 5 to 95 percent (non-condensing) and have transmissions at 10 percent duty cycle above 60 degrees C.

86-2.19C(2)(a)(ii) Physical Characteristics

The modem shall weigh less than 2 lbs and have overall dimensions of less than 7 1/8 by 3-1/2 by 1-1/8 inches. The housing shall be constructed of anodized aluminum.

The modem shall have the following status indicators:

1. Power (on).
2. Channel acquired.
3. Link status.
4. Network registration.
5. Received signal strength indicator.
6. Transmit and receive data.
7. Block errors.

86-2.19C(2)(a)(iii) Operational Parameters

The modem shall operate in a dynamic IP addressing environment of GPRS networks at 1900/850 MHz and meet the following operational parameters:

Receiver sensitivity	-107 dBm (2.439 percent bit error rate)
Input voltage	From 10 to 28 V(dc)
Input current	From 40 mA to 200 mA

86-2.19C(2)(a)(iv) Application Interfaces

The modem shall have the following standard interfaces:

1. The AT command serial character stream uses TCP/IP.
2. Host communicates with modem using either UDP or TCP packet modes.
3. Computer terminal platform using Windows 7/XP and Dial-Up Networking communicates with the modem using PPP.

86-2.19C(2)(b) Power Supply

The power supply shall be vertically mountable on a 19-inch standard rack rail using two machine screws and 2 wing nuts. The power supply shall have provisions to attach the modem power cable securely without the need for modifying the modem power cable.

86-2.19C(2)(c) Serial Communication Cable – Type D

Where the modem is designed to interface with a State-furnished Model 170E controller, you must provide a communication cable known as the C2 cable. The C2 cable must interface the Department-furnished Model 170E controller C2 connector and the GPRS modem and include all conductors and connectors required for that purpose. The GPRS modem connector must meet TIA-232 standard using a 9 pin Type D connector. All pins in both connectors must be gold plated. The cable must have four No. 20 AWG conductors with (UL) Type CM shielded or AWM 2464 80C 300 Volts – CMG. The cable must be at least 3 feet long. The cable wiring must comply with the following:

1. AMP 201360-2-ND -L to DE9-P - 2
2. AMP 201360-2-ND -K to DE9-P - 3
3. AMP 201360-2-ND -N to DE9-P - 5
4. AMP 201360-2-ND -D to AMP 201360-2-ND - H
5. AMP 201360-2-ND -J to AMP 201360-2-ND - M

86-2.19C(3) Construction

86-2.19C(3)(a) Installation

The installation of the modem must be according to the plans, the manufacturer's instructions, and adjusted per field conditions.

86-2.19C(4) Payment

Payment for GPRS communication services is included in the payment for temporary communications system.

Add to Section 86-2:

86-2.20 COMMUNICATION SYSTEM

86-2.20A General

Section 86-2.20 includes specifications for the installation and modification to the communication system.

86-2.20A(1) Fiber Optic Cable System

86-2.20A(1)(a) Fiber Optic Glossary

The following definitions apply:

Active Component Link Loss Budget: The active component link loss budget is the difference between the average transmitter launch power (in dBm) and the receiver maximum sensitivity (in dBm).

Backbone: Fiber cable that provides connections between the TMC and hubs, as well as between equipment rooms or buildings, and between hubs. The term is used interchangeably with "trunk" cable.

Connector: A mechanical device used to align and join 2 fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel).

Connectorized: The termination point of a fiber after connectors have been affixed.

Connector Module Housing (CMH): A patch panel used to terminate single mode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.

Couplers: Devices which mate fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They are normally located within FDUs, mounted in panels. They may also be used unmounted, to join 2 simplex fiber runs.

Distribution Cable: Fiber cable that provides connections between hubs. Drop cables are typically spliced into a distribution cable.

Drop Cable: Fiber cable that provides connections between a distribution cable to a field element. Typically these run from a splice vault to a splice tray within a field cabinet. Drop cables are usually short in length (less than 60 feet) and are of the same construction as outside plant cable. The term "breakout cable" is used interchangeably with drop cable.

End-to-End Loss: The maximum permissible end-to-end system attenuation is the total loss in a given link. This loss could be the actual measured loss, or calculated using typical (or specified) values. A designer should use typical values to calculate the end-to-end loss for a proposed link. This number will determine the amount of optical power (in dB) needed to meet the System Performance Margin.

Fan Out Termination: Permits the branching of fibers contained in an optical cable into individual cables and can be done at field locations; thus, allowing the cables to be connectorized or terminated per system requirements. A kit provides pull-out protection for individual bare fibers to support termination. It provides 3 layers of protection consisting of a Teflon inner tube, a dielectric strength member, and an outer protective PVC jacket. Fan out terminations must not be used for more than 6 fibers. Using a patch panel would be appropriate.

Fiber Distribution Frame (FDF): A rack mounted system that is usually installed in hubs or the Transportation Management Center (TMC) that may consist of a standard equipment rack, fiber routing guides, horizontal jumper troughs and Fiber Distribution Units (FDU). The FDF serves as the termination and interconnection of passive fiber optic components from cable breakout, for connection by jumpers, to the equipment.

Fiber Distribution Unit (FDU): An enclosure or rack mountable unit containing both a patch panel with couplers and splice tray(s). The unit's patch panel and splice trays may be integrated or separated by a partition.

F/O: Fiber optic.

FOIP: Fiber optic inside plant cable.

FOOP: Fiber optic outside plant cable.

FOTP: Fiber optic test procedure(s) as defined by TIA standards.

Jumper: A short cable, typically one meter or less, with connectors on each end, used to join 2 CMH couplers or a CMH to active electronic components.

Light Source: Portable fiber optic test equipment that, when coupled with a power meter, is used to perform end-to-end attenuation testing. It contains a stabilized light source operating at the wavelength of the system under test.

Link: A passive section of the system, the ends of which are connectorized. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (MUX).

Loose Tube Cable: Type of cable construction in which fibers are placed in buffer tubes to isolate them from outside forces (stress). A flooding compound or material is applied to the interstitial cable core to prevent water migration and penetration. This type of cable is primarily for outdoor applications.

Mid-span Access Method: Description of a procedure in which fibers from a single buffer tube are accessed and spliced to an adjoining cable without cutting the unused fibers in the buffer tube, or disturbing the remaining buffer tubes in the cable.

Optical Time Domain Reflectometer (OTDR): Fiber optic test equipment similar in appearance to an oscilloscope that is used to measure the total amount of power loss in a F/O cable between 2 points. It provides a visual and printed display of the losses associated with system components such as fiber, splices and connectors.

Optical Attenuator: An optical element that reduces the intensity of a signal passing through it.

Patchcord: A term used interchangeably with "jumper."

Patch Panel: A precision drilled metal frame containing couplers used to mate 2 fiber optic connectors.

Pigtail: A short optical fiber permanently attached to a source, detector, or other fiber optic device.

Power Meter: Portable fiber optic test equipment that, when coupled with a light source, is used to perform end-to-end attenuation testing. It contains a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of optical power being received at the end of the link.

Riser Cable: NEC approved cable installed in a riser (a vertical shaft in a building connecting floors).

Segment: A section of F/O cable that is not connected to any active device and may or may not have splices per the design.

SMFO: Single mode Fiber Optic Cable.

Splice: The permanent joining of two fiber ends using a fusion splicer.

Splice Enclosure: An environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations. Normally installed in a splice vault.

Splice Tray: A container used to organize and protect spliced fibers.

Splice Vault: An underground container used to house excess cable and/or splice enclosures.

System Performance Margin: A calculation of the overall "End to End" permissible attenuation from the fiber optic transmitter (source) to the fiber optic receiver (detector). The system performance margin should be at least 6 dB. This includes the difference between the active component link loss budget, the passive cable attenuation (total fiber loss) and the total connector/splice loss.

Tight Buffered, Non-Breakout Cable (Tight Buffer Cable): Type of cable construction where each glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 µm (compared to 250 µm for loose tube fibers).

86-2.20A(2) Fiber Optic Outside Plant Cable

86-2.20A(2)(a) General

Each fiber optic outside plant cable (FOOP) for this project must be all dielectric, gel filled or water-blocking material, duct type, with loose buffer tube construction with a maximum outside diameter of 0.55 inch. Cables must contain single mode (SM) dual-window (1310 nm and 1550 nm) fibers with the numbers described below:

Type A cable	36 SM fibers
Type B cable	72 SM fibers
Type C cable	72 SM fibers
Type D cable	12 SM fibers

The optical fibers must be contained within loose buffer tubes. The loose buffer tubes must be stranded around an all dielectric central member. A polyethylene outside jacket must provide for overall protection.

The cable must be qualified as compliant with RUS Federal Rule 7CFR1755.900, 1755.901, and 1755.902.

86-2.20A(2)(b) Fiber Characteristics

Each optical fiber must be glass and consist of a doped silica core surrounded by concentric silica cladding. All fibers in the buffer tube must be usable fibers, and must be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of these specifications. The required fiber grade must reflect the maximum individual fiber attenuation, to guarantee the required performance of each and every fiber in the cable.

The coating must be a dual layered, UV cured acrylate. The coating must be mechanically or chemically strippable without damaging the fiber.

The cable must comply with the optical and mechanical requirements over an operating temperature range of -40 to +158 degrees F. The cable must be tested in accordance with TIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." The change in attenuation at extreme operational temperatures (-40 to +158 degrees F) for single mode fiber must not be greater than 0.124 dB/mi, with 80 percent of the measured values no greater than 0.062 dB/mi. The single mode fiber attenuation must be measured at 1550 nm.

For all fibers the attenuation specification must be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Single mode fibers within the finished cable must meet the requirements in the following table:

Fiber characteristics table

Parameter	Characteristic
Type	Step index
Core diameter	8.3 μm (nominal)
Cladding diameter	125 μm \pm 1.0 μm
Core to cladding off set	\leq 1.0 μm
Coating diameter	250 μm \pm 15 μm
Cladding non-circularity defined as: [1-(min. cladding dia \div max. cladding dia.)]x100	\leq 2.0%
Proof/tensile test	345 MPa, Min
Attenuation: @1310 nm @1550 nm	\leq 0.4 dB/km \leq 0.4 dB/km
Attenuation at the water peak	\leq 2.1 dB/km @ 1383 \pm 3 nm
Chromatic dispersion: Zero dispersion wavelength Zero dispersion slope Maximum dispersion:	1301.5 to 1321.5 nm \leq 0.092 ps/(nm ² *km) \leq 3.3 ps/(nm*km) for 1285 to 1330 nm < 18 ps/(nm*km) for 1550 nm
Cut-off wavelength	<1250 nm
Mode field diameter (Petermann II)	9.3 \pm 0.5 μm at 1310 nm 10.5 \pm 1.0 μm at 1550 nm

86-2.20A(2)(c) Color Coding

In buffer tubes containing multiple fibers, each fiber must be distinguishable from others in the same tube by means of color coding according to the following:

1. Blue (BL)	7. Red (RD)
2. Orange (OR)	8. Black (BK)
3. Green (GR)	9. Yellow (YL)
4. Brown (BR)	10. Violet (VL)
5. Slate (SL)	11. Rose (RS)
6. White (WT)	12. Aqua (AQ)

Buffer tubes containing fibers must also be color coded with distinct and recognizable colors according to the same table listed above for fibers.

The colors must be targeted in accordance with the Munsell color shades and must meet TIA 598 "Color Coding of Fiber Optic Cables."

The color formulation must be compatible with the fiber coating and the buffer tube filling compound, and be heat stable. It must not fade or smear or be susceptible to migration and it must not affect the transmission characteristics of the optical fibers and must not cause fibers to stick together.

86-2.20A(2)(d) Cable Construction

86-2.20A(2)(d)(i) General

Fiber optic cable samples, 10 feet in length, with part numbers, catalogue information, and documents from manufacturer must be submitted.

The fiber optic cable must contain the following components:

1. Buffer tubes
2. Central member
3. Filler rods
4. Stranding
5. Core and cable flooding
6. Ripcord
7. Outer jacket

86-2.20A(2)(e) Buffer Tubes

Clearance must be provided in the loose buffer tubes between the fibers and the inside of the tube to allow for expansion without constraining the fiber. The fibers must be loose or suspended within the tubes. The fibers must not adhere to the inside of the buffer tube. Each buffer tube must contain 1, 6 or a maximum of 12 fibers.

For water migration resistance, each loose buffer tube must contain a water swellable yarn or a homogeneous hydrocarbon-based gel with anti-oxidant additives.

The filling compound must be non-toxic and dermatologically safe to exposed skin. It must be chemically and mechanically compatible with all cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. The filling compound must be free from dirt and foreign matter and must be readily removable with conventional nontoxic solvents.

Buffer tubes must be stranded around a central member by a method that will prevent stress on the fibers when the cable jacket is placed under strain, such as the reverse oscillation stranding process.

Each buffer tube must be distinguishable from other buffer tubes in the cable by means of the color coding as specified above for the fibers.

86-2.20A(2)(f) Central Member

The central member, which functions as an anti-buckling element, must be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. A linear overcoat of low density polyethylene must be applied to the central member to achieve the optimum diameter to provide the proper spacing between buffer tubes during stranding.

86-2.20A(2)(g) Filler Rods

Fillers may be included in the cable to maintain the symmetry of the cable cross-section. Filler rods must be solid medium or high density polyethylene. The diameter of filler rods must be the same as the outer diameter of the buffer tubes.

86-2.20A(2)(h) Stranding

Completed buffer tubes must be stranded around the overcoated central member using stranding methods, lay lengths and positioning such that the cable must meet mechanical, environmental and performance specifications. A polyester binding must be applied over the stranded buffer tubes to hold them in place. Binders must be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders must be non-hygroscopic, non-wicking (or rendered so by the flooding compound), and dielectric with low shrinkage.

86-2.20A(2)(i) Core and Cable Flooding

The cable core must contain a water-blocking material or the cable core interstices must be filled with a polyolefin based compound to prevent water ingress and migration. The water blocking material or the flooding compound must be homogeneous, non-hygroscopic, electrically non-conductive, and non-nutritive to fungus. The core must be free from dirt and foreign matter and must be readily removable with

conventional nontoxic solvents. The compound must also be nontoxic, dermatologically safe and compatible with all other cable components.

86-2.20A(2)(j) Ripcord

The cable must contain at least one ripcord under the jacket for easy sheath removal.

86-2.20A(2)(k) Outer jacket

The jacket must be free of holes, splits, and blisters and must be medium or high density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 40 mils ± 3 mils. Jacketing material must be applied directly over the flooding compound. The polyethylene must contain carbon black to provide ultraviolet light protection and must not promote the growth of fungus.

The jacket or sheath must be marked with the manufacturer's name, the words "Optical Cable," the number of fibers, "SM," year of manufacture, and sequential measurement markings every 3 ft. The actual length of the cable must be within $-0/+1$ percent of the length marking. The marking must be in a contrasting color to the cable jacket. The height of the marking must be approximately 0.1 inch.

86-2.20A(2)(l) General Cable Performance Specifications

The fiber optic cables must be fully compatible and interoperable with Caltrans District 12 existing fiber optic cable systems.

The F/O cable must withstand water penetration when tested with a 3 foot static head or equivalent continuous pressure applied at one end of a 3 foot length of filled cable for one hour. No water must leak through the open cable end. Testing must be done in accordance with TIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

Provide proof of a cable sample tested in accordance with TIA-455-81A, "Compound Flow (Drip) Test for Filled Fiber Optic Cable." The test sample must be prepared in accordance with Method A. The cable must exhibit no flow (drip or leak) at 176 degrees F as defined in the test method.

Provide proof of: Crush resistance of the finished F/O cables must be 126 lbf/in applied uniformly over the length of the cable without showing evidence of cracking or splitting when tested in accordance with TIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables." The average increase in attenuation for the fibers must be ≤ 0.10 dB at 1550 nm for a cable subjected to this load. The cable must not exhibit any measurable increase in attenuation after removal of load. Testing must be in accordance with TIA-455-41 (FOTP-41), except that the load must be applied at the rate of 0.118 to 0.787 inch per minute and maintained for 10 minutes.

Provide proof of: The cable must withstand 25 cycles of mechanical flexing at a rate of 30 ± 1 cycles/minute. The average increase in attenuation for the fibers must be ≤ 0.20 dB at 1550 nm at the completion of the test. Outer cable jacket cracking or splitting observed under 10x magnification must constitute failure. The test must be conducted in accordance with TIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with the sheave diameter a maximum of 20 times the outside diameter of the cable. The cable must be tested in accordance with Test Conditions I and II of (FOTP-104).

Impact testing must be conducted in accordance with TIA-455-25 (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The cable must withstand 20 impact cycles. The average increase in attenuation for the fibers must be ≤ 0.20 dB at 1550 nm. The cable jacket must not exhibit evidence of cracking or splitting.

The finished cable must withstand a tensile load of 600 lbf without exhibiting an average increase in attenuation of greater than 0.20 dB. The test must be conducted in accordance with TIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load must be applied for one half hour in Test Condition II of the TIA-455-33 (FOTP-33) procedure.

86-2.20A(2)(m) Packaging and Shipping Requirements

Comply with section 86-2.20A(10)(b).

The completed cable must be packaged for shipment on reels. The cable must be wrapped in a weather and temperature resistant covering. Both ends of the cable must be sealed to prevent the ingress of moisture.

Each end of the cable must be securely fastened to the reel to prevent the cable from coming loose during transit. Ten feet of cable length on each end of the cable must be accessible for testing.

Each cable reel must have a durable weatherproof label or tag showing the manufacturer's name, the cable type, the actual length of cable on the reel, the contract number, and the reel number. A shipping record must also be included in a weatherproof envelope showing the above information and also include the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and any other pertinent information.

The cost of any damaged or broken fiber cable must be borne by you.

The minimum hub diameter of the reel must be at least 30 times the diameter of the cable. The F/O cable must be in one continuous length per reel with no factory splices in the fiber. Each reel must be marked to indicate the direction the reel should be rolled to prevent loosening of the cable.

Installation procedures and technical support information must be furnished at the time of delivery.

86-2.20A(3) Cable Installation

Installation procedures must be in conformance with the procedures specified by the cable manufacturer for the specific cable being installed. You must submit the manufacturer's recommended procedures for pulling fiber optic cable at least 20 working days before installing cable. Mechanical aids may be used provided that a tension measuring device and a breakaway swivel are placed in tension to the end of the cable. The tension in the cable must not exceed 500 lbf or the manufacturer's recommended pulling tension, whichever is less.

During cable installation, the bend radius must be maintained at a minimum of 20 times the outside diameter. The cable grips for installing the fiber optic cable must have a ball bearing swivel to prevent the cable from twisting during installation.

F/O cable must be installed using a cable pulling lubricant recommended by the F/O cable manufacturer, and a pull tape. The pull tape must be flat, woven, lubricated polyester tape with a tensile strength of 1800 lbf and printed sequential meter markings. Your personnel must be stationed at each splice vault and pull box through which the cable is to be pulled to lubricate and prevent kinking or other damage.

F/O cable must be installed without splices except where specifically shown. If splice locations are not shown, splicing must be limited to 1 cable splice every 3.73 mi, except as otherwise approved. Any midspan access splice or FDU termination must involve only those fibers being spliced as shown. Cable splices must be located in splice enclosures, installed in splice vaults shown. A minimum of 60 feet of slack must be provided for each F/O cable at each splice vault. Slack must be divided equally on each side of the F/O splice enclosure.

The fiber installation equipment must incorporate a mechanical drive unit or pusher, which feeds cable into the pressurized conduit to provide a sufficient push force on the cable, which is coupled with the drag force created by the high-speed airflow. The unit must be equipped with controls to regulate the flow rate of compressed air entering the conduit and any hydraulic or pneumatic pressure applied to the cable. Mid assist or cascading of equipment must be for the installation of long cable runs. The equipment must incorporate safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.

The equipment must not require the use of a piston or any other air capturing device to impose a pulling force at the front end of the cable, which also significantly restricts the free flow of air through the conduit. It must incorporate the use of a counting device to determine the speed of the cable during installation and the length of the cable installed.

86-2.20A(4) Splicing

Field splices must be done either in splice vaults or cabinets as shown. All splices in splice vaults must be done in splice trays, housed in splice enclosures. All splices in cabinets must be done in splice trays housed in FDU's.

Unless otherwise specified, fiber splices must be the fusion type. The mean splice loss must not exceed 0.07 dB per splice. The mean splice loss must be obtained by measuring the loss through the splice in both directions and then averaging the resultant values.

All fusion splices must be protected with a metal reinforced thermal shrink sleeve.

The mid-span access method must be used to access the individual fibers in a cable for splicing to another cable as shown. Cable manufacturers recommended procedures and approved tools must be used when performing a mid-span access. Only the fibers to be spliced may be cut. All measures must be taken to avoid damaging buffer tubes and individual fibers not being used in the mid-span access.

The individual fibers must be looped one full turn within the splice tray to avoid micro bending. A 2 inch minimum bend radius must be maintained during installation and after final assembly in the optical fiber splice tray. Each bare fiber must be individually restrained in a splice tray. The optical fibers in buffer tubes and the placement of the bare optical fibers in the splice tray must be such that there is no discernable tensile force on the optical fiber.

You will be allowed to splice a total of 2 fibers to repair any damage done during mid-span access splicing without penalty. You will be assessed a fine of \$300.00 for each additional and unplanned splice.

Any single fiber may not have more than 3 unplanned splices. If any fiber requires more than 3 unplanned splices, the entire length of F/O cable must be replaced at your expense.

86-2.20A(5) Fiber Optic Splice Enclosure

The F/O field splices must be enclosed in splice enclosures which must be complete with splice organizer trays, brackets, clips, cable ties, seals and sealant, as needed. The splice enclosure must be suitable for a direct burial or pull box application. Manufacturer's installation instructions must be supplied before the installation of any splice enclosures. Location of the splice enclosures must be where a splice is required as shown, designated, or described.

The fiber optic splice enclosure must consist of an outer enclosure, an inner enclosure and splice trays.

The fiber optic splice enclosure must be suitable for a temperature range of 32 to 122 degrees F.

The size of the enclosure must allow all the fibers of the largest fiber optic cable to be spliced to a second cable of the same size, plus 12 additional pigtailed. The enclosure must be not more than 36 inches in length and not more than 8 inches in diameter. Two outer enclosures must fit into the fiber optic splice vault and must leave sufficient space for routing of the fiber optic communication cables, without exceeding the minimum bending radius of any cable. The enclosures must be designed for butt splicing.

The splice enclosure must conform to the following specifications:

1. Non-filled thermoplastic case
2. Rodent proof, water proof, re-enterable and moisture proof
3. Expandable from 2 cables per end to 8 cables per end by using adapter plates
4. Cable entry ports must accommodate 0.4 inch to 1.0 inch diameter cables
5. Multiple grounding straps
6. Accommodate up to 8 splice trays
7. Suitable for "butt" or "through" cable entry configurations
8. Place no stress on finished splices within the splice trays

All materials in the enclosures must be nonreactive and must not support galvanic cell action. The outer enclosure must be compatible with the other enclosure components, the inner enclosure, splice trays, and cables.

The end plate must consist of 2 sections and must have capacity for 2 fiber optic trunk communication cables and 2 fiber optic pigtailed communication.

The outer enclosure must protect the splices from mechanical damage, must provide strain relief for the cable, and must be resistant to salt corrosion.

The outer enclosure must be waterproof, re-enterable and must be sealed with a gasket. The outer enclosure must be flash-tested at 15 psi.

The inner enclosure must be of metallic construction. The inner enclosure must be compatible with the outer enclosure and the splice trays and must allow access to and removal of individual splice trays. The splice trays must be compatible with the inner enclosure and must be constructed of rigid plastic or metal.

Adequate splice trays must be provided to splice all fibers of the largest fiber optic cable, plus 12 pigtails.

Vinyl markers must be used to identify each spliced fiber in the trays as described in the "Labeling" section.

Each splice must be individually mounted and mechanically protected in the splice tray.

You must install the fiber splice enclosure in the splice vaults where splicing is required. The fiber optic splice enclosures must be securely fastened or bolted to the side wall of the splice vault using standard hardware found in communication manholes.

You must provide all mounting hardware required to securely mount the enclosures to the splice vault.

The fiber splice enclosure must be mounted horizontally in a manner that allows the cables to enter at the end of the enclosure. Not less than 30 feet of each cable must be coiled in the vault to allow the fiber splice enclosure to be removed for future splicing.

The unprotected fibers exposed for splicing within the enclosure must be protected from mechanical damage using the fiber support tube or tubes and must be secured within the fiber splice enclosure.

Upon completion of the splices, the splice trays must be secured to the inner enclosure.

You must verify the quality of each splice before sealing the splice enclosure. The splice enclosure must not be sealed until link testing is performed and is approved.

The enclosure must be sealed using a procedure recommended by the manufacturer that will provide a waterproof environment for the splices. Encapsulant must be injected between the inner and outer enclosures.

Care must be taken at the cable entry points to ensure a tight salt resistant and waterproof seal is made which will not leak upon aging. It is acceptable to have multiple pigtails enter the fiber splice enclosure through one hole as long as all spaces between the cables are adequately sealed.

86-2.20A(6) Splice Trays

Splice trays must accommodate a minimum of 12 fusion splices and allow for a minimum bend radius of 2 inch. Individual fibers must be looped one full turn within the splice tray to allow for future splicing. No stress must be applied on the fiber when it is located in its final position. Buffer tubes must be secured near the entrance of the splice tray to reduce the chance that an inadvertent tug on the pigtail will damage the fiber. The splice tray cover may be transparent.

Splice trays in the splice enclosure must conform to the following:

1. Accommodate up to 24 fusion splices.
2. Place no stress on completed splices within the tray.
3. Stackable with a snap-on hinge cover.
4. Buffer tubes securable with channel straps.
5. Labeled after splicing is completed.

Only one single splice tray may be secured by a bolt through the center of the tray in the fiber termination unit. Multiple trays must be securely held in place in accordance with the manufacturer's recommendation.

86-2.20A(7) Passive Cable Assemblies and Components

The F/O assemblies and components must be compatible components, designed for the purpose intended, and manufactured by a company regularly engaged in the production of material for the fiber optic industry. All components or assemblies must be best quality, non-corroding, with a design life of at least 20 years.

86-2.20A(8) Labeling After Installation

86-2.20A(8)(a) General

You must label all fiber optic cabling in a permanent consistent manner. All tags must be of a material designed for long term permanent labeling of fiber optic cables and must be marked with permanent ink on non-metal types, or embossed lettering on metal tags. Metal tags must be constructed of stainless

steel. Non-metal label materials must be approved. Labels must be affixed to the cable in accordance with the manufacturer's recommendations and must not be affixed in a manner which will cause damage to the fiber. Handwritten labels will not be allowed.

86-2.20A(8)(b) Labeling of Backbone, Distribution and Drop Fiber Optic Cables

Labeling of the backbone, distribution and drop fiber optic cables must conform to the following unique identification code elements:

UNIQUE IDENTIFICATION CODE ELEMENTS FOR BACKBONE, DISTRIBUTION OR DROP CABLES		
Description	Code	Number of characters
District	District number	2
Cable type	Fiber: S: Single mode, M: Multimode Copper: T: 18 AWG, U: 19 AWG, V: 20AWG, W: 22AWG, X: 24 AWG	1
Cable fiber (or copper pairs) count	Number of fibers or conductor pairs (Examples: 144 fibers; or 100 TWP)	3
Route number	Hwy. Rte (Example: 022)	3
Begin function	T: TMC; H: HUB; V: Video Node; D: Data Node; C: Cable Node; M: CCTV Camera; N: CMS; P: Traffic Signal; Z: Ramp Meter; U: Traffic Monitoring/Count Station/Vehicle Count Station (VDS, TOS); S: Splice Vault	1
Begin function number	Unique ID number corresponds to Begin Function (Example: H02 [Hub 02])	2
End function	T: TMC; H: HUB; V: Video Node; D: Data Node; C: Cable Node; M: CCTV Camera; N: CMS; P: Traffic Signal; Z: Ramp Meter; U: Traffic Monitoring/Count Station; S: Splice Vault	1
End function number	Unique ID number corresponds to End Function (Example: H03 [Hub 03])	2
Unique identifier	XX: If two or more cables of the same count are in the same run	2
TOTAL		17

Each cable must display one unique identification code, regardless of where the cable is viewed. The begin function and end function correspond to the end points of each cable. The order of the beginning and end function follow a hierarchy as listed below, where the lowest number corresponding to the begin/end function is listed first.

Hierarchy	
1	TMC
2	HUB
3	Video Node (VN)
4	Data Node (DN)
5	Cable Node
6	CCTV Camera
7	CMS
8	Traffic Signal
9	Ramp Meter
10	Traffic Monitoring/Count Station
11	Splice Vault

This scheme is as follows: A cable between the TMC and a HUB will always have the TMC listed as the start function and the HUB as the end function. Between a CMS and a Splice Vault, the start function will always be listed as the CMS, and so on. If a cable is connected between HUBs, for example HUB-01 and HUB-03, the lowest number, in this case HUB-01, will be listed as the start function and HUB-03 as the end function. Examples are as follows:

- 12S060005H02H0302: This cable is located in District 12, is a single mode fiber optic cable containing 60 fibers, is installed along highway Route 05, beginning in Hub 2, and ending in Hub 3, with unique ID of number 2. The unique ID provides for another 60 fiber optic cable between those hubs. This is an example for a backbone cable.

86-2.20A(8)(c) Labeling of Jumpers and Pigtails

Labeling of the jumpers and pigtails must conform to the following unique identification code elements:

UNIQUE IDENTIFICATION CODE ELEMENTS for JUMPERS (active component to FDU) and PIGTAILS (to connector # on patch panel)		
Description	Code	Number Of characters
Hub identifier	Hub, TMC, VN or DN ID Numbers or Alphanumeric or both	2
From (source) device	MU: Multiplexer FD: FDU (Fiber Distribution Unit) RP: Repeater	2
From (source) device identifier	Numbers or Alphanumeric or both	2
Transmitter or receiver	T or R	1
To (destination) device	MU: Multiplexer FD: FDU (Fiber Distribution Unit) RP: Repeater	2
To (destination) device identifier	Numbers or Alphanumeric or both	2
Connector identifier	Connector ID	2
TOTAL		13

Examples are as follows:

- 01MU01TFD0203: This pigtail is located in Hub 1, from multiplexer 01, transmitting to FDU 02 to patch panel position (connector) 03.
- 02MUA1TFD0B08: This jumper is located in Hub 2, from multiplexer A1, transmitting to FDU B, to patch panel position (connector) 08.

86-2.20A(8)(d) Label Placement

86-2.20A(8)(d)(i) Cables

All cables must be clearly labeled with the unique identification code element method described, at all terminations, even if no connections or splices are made, and at all splice vault entrance and exit points.

86-2.20A(8)(d)(ii) Cable to Cable Splices

All cable jackets entering the splice enclosure must be labeled in accordance with the identification method described.

86-2.20A(8)(d)(iii) Cable to Fiber Distribution Units

The cable jackets must be clearly labeled at entry to the FDU in accordance with the unique identification code element method described in these special provisions. In addition, each fiber must be labeled with the Fiber ID and pigtails must be labeled at the connector with the Fiber ID. The FDU must be clearly labeled with the Cable ID on the face of the FDU. If multiple cables are connected to the FDU, each block of connectors relating to each individual cable must be clearly identified by a single label with the Cable ID. Individual connections must be clearly marked on the face of the FDU in the designated area with the Fiber ID.

86-2.20A(8)(d)(iv) Fiber

Fiber labels must be placed next to the connectors of the individual fibers.

86-2.20A(8)(d)(v) Patch Panels

The cable jackets must be clearly labeled at entry to the patch panel in accordance with the unique identification code element method described in these special provisions. In addition, each fiber must be labeled with the Fiber ID and pigtails must be labeled at the connector with the Fiber ID. The patch panel must be clearly labeled with the Cable ID on the face of the panel. If multiple cables are connected to the patch panel, each block of connectors relating to each individual cable must be clearly identified by a single label with the Cable ID. Individual connections must be clearly marked on the face of the panel in the designated area with the Fiber ID.

86-2.20A(8)(d)(vi) Jumpers

Equipment to FDU jumpers must be labeled as to the equipment type connected and must be labeled at both ends. FDU to FDU jumpers must be labeled at each end in accordance with the unique identification code element method described in these special provisions.

86-2.20A(8)(d)(vii) Pigtails

Pigtails must be labeled at the connector in accordance with the unique identification code element method described.

86-2.20A(9) Fiber Optic Cable Terminators

At the FDU, the cable jacket of the FOIP or outside plant cable must be removed, exposing the filler rods and buffer tubes. The exposed length of the buffer tubes must be at least the length recommended by the FDU manufacturer which allows the tubes to be secured to the splice trays.

Each buffer tube must be secured to the splice tray in which it is to be spliced. The remainder of the tubes must be removed to expose sufficient length of the fibers in order to properly install on the splice tray.

When applicable, moisture blocking gel must be removed from the exposed buffer tubes and fibers. The transition from the buffer tube to the bundle of jacketed fibers must be treated by an accepted procedure for sleeve tubing, shrink tube and silicone blocking of the transition to prevent future gel leak.

Manufacturer directions must be followed to ensure that throughout the specified temperature range gel will not flow from the end of the buffer tube. The individual fibers must be stripped and prepared for splicing.

Factory terminated pigtails must then be spliced and placed in the splice tray.

Except as otherwise determined by the Engineer, all fibers inside a fiber optic cable entering a Fiber Distribution Unit (FDU), such as at a TMC or hub, must be terminated and labeled. Attention is directed to "Fiber Distribution Unit" of these special provisions.

A transition must then be made, with flexible tubing, to isolate each fiber to protect the individual coated fibers. The final transition from bundle to individual fiber tube must be secured with an adhesive heat shrink sleeve.

86-2.20A(9)(a) Fiber Optic Cable Assemblies and Pigtails

86-2.20A(9)(a)(i) General

Cable assemblies (jumpers and pigtails) must be products of the same manufacturer. The cable used for cable assemblies must be made of fiber meeting the performance requirements for the F/O cable being connected.

86-2.20A(9)(a)(ii) Pigtails

Pigtails must be of simplex (one fiber) construction, in 900 μm tight buffer form, with a PVC jacket with manufacturer identification information, and a nominal outer jacket diameter of 0.12 inch. Single mode simplex cable jackets must be yellow in color. All pigtails must be factory terminated and tested and at least 3 feet in length.

86-2.20A(9)(a)(iii) Jumpers

Jumpers may be of simplex or duplex design. Duplex jumpers must be of duplex round cable construction, and must not have zipcord (siamese) construction. All jumpers must be at least 6.6 feet in length, sufficient to avoid stress and allow orderly routing.

The outer jacket of duplex jumpers must be colored according to the single mode color (yellow) specified above. The 2 inner simplex jackets must be contrasting colors to provide easy visual identification for polarity.

86-2.20A(9)(a)(iv) Connectors

Connectors must be of the ceramic ferrule SC type for SM. Indoor SC connector body housings must be either nickel plated zinc or glass reinforced polymer construction. Outdoor SC connector body housing must be glass reinforced polymer.

The associated coupler must be of the same material as the connector housing.

All F/O connectors must be the 0.1 inch SC connector ferrule type with Zirconia Ceramic material with a PC (Physical Contact) pre-radiused tip.

The connector operating temperature range must be -40 to 158 degrees F. Insertion loss must not exceed 0.4 dB for single mode, and the return reflection loss on single mode connectors must be at least 55 dB. Connection durability must be less than a 0.2 dB change per 500 mating cycles per TIA-455-21A (FOTP-21).

All terminations must provide a minimum 50 lbf pull out strength. Factory test results must be documented and submitted before installing any of the connectors. Single mode connectors must have a yellow color on the body and/or boot that renders them easily identifiable.

Field terminations must be limited to splicing of adjoining cable ends and/or cables to SC pigtails.

86-2.20A(9)(b) Fiber Distribution Unit

You must terminate the incoming fiber optic cables to existing FDU.

86-2.20A(10) Fiber Optic Testing

86-2.20A(10)(a) General

Testing must include the tests on all new elements of the passive fiber optic components: (1) after delivery to the project site but before installation, (2) after installation but before connection to any other portion of the system. You must provide all personnel, equipment, instrumentation and materials necessary to perform all testing. The Engineer must be notified two working days before all field tests. The notification must include the exact location or portion of the system to be tested.

Documentation of all test results must be provided within 2 working days after the test involved.

86-2.20A(10)(b) Factory Testing Documentation

Documentation of factory testing and compliance with the fiber specifications as listed in the Fiber Characteristics Table must be supplied a minimum of 15 working days before arrival of the cable at the site.

86-2.20A(10)(c) After Cable Installation

Index matching gel must not be allowed in connectors during testing. After the FO has been pulled but before breakout and termination, 100 percent of all the fibers must be tested with an OTDR for attenuation.

Test results must be recorded, dated, compared and filed with the previous copies of these tests. Copies of traces and test results must be submitted for approval.

If the OTDR test results are unsatisfactory, the F/O cable segment is unacceptable. The unsatisfactory segment of cable must be replaced with a new segment, without additional splices, at your expense.

The new segment of cable then must be tested to demonstrate acceptability.

Copies of the test results must be submitted for review and approval.

86-2.20A(11) Outdoor Splices

At the conclusion of all outdoor splices at one location, and before they are enclosed and sealed, all splices must be tested with the OTDR, in both directions. Splices in singlemode segments must be tested at 1310 nm and at 1550 nm.

Individual fusion splice losses must not exceed 0.07 dB. Measurement results must be recorded, dated, validated by the OTDR trace printout and filed with the records of the respective cable runs. Copies of traces and test results must be submitted.

86-2.20A(12) System Verification at Completion

You must test all fiber optic cables from Data Node 6 (SR-91/Brookhurst St) and Hub 2 (SR-91/SR-55) to field elements.

86-2.20A(12)(a) Power Meter and Light Source

At the conclusion of the OTDR testing, 100 percent of the fiber links must be tested end to end with a power meter and light source, in accordance with TIA Optical Test Procedure 171 and in the same wavelengths specified for the OTDR tests. These tests must be conducted in one direction. As shown in Appendix A, the Insertion Loss (1C) must be calculated.

Test results must be recorded, compared, and filed with the other recordings of the same links. Test results must be submitted. These values must be recorded in the Cable Verification Worksheet in Appendix A.

86-2.20A(12)(b) OTDR Testing

Once the passive cabling system has been installed and is ready for activation, 100 percent of the fibers must be tested with the OTDR for attenuation at wavelengths of both 1310 nm and 1550 nm. OTDR testing must be performed in both directions (bidirectional), on all fibers.

Test results must be generated from software of the test equipment, recorded, dated, compared and filed with previous copies. A hard copy printout and a electronic copy of traces and test results must be submitted.

The average of the two losses must be calculated, and recorded in the Cable Verification Worksheet in Appendix A. The OTDR must be capable of recording and displaying anomalies of at least 0.02 dB. All connector losses must be displayed on the OTDR traces.

86-2.20A(12)(c) Cable Verification Worksheet

The Cable Verification Worksheet shown in Appendix A must be completed for all links in the fiber optic system, using the data gathered during cable verification. The completed worksheets must be included as part of the system documentation.

86-2.20A(12)(d) Test Failures

If the link loss measured from the power meter and light source exceeds the calculated link loss, or the actual location of the fiber ends does not agree with the expected location of the fiber ends (as would occur with a broken fiber), the fiber optic link will not be accepted. The unsatisfactory segments of cable or splices must be replaced with a new segment of cable or splice at your expense.

The OTDR testing, power meter and light source testing and Cable Verification Worksheet must be completed for the repaired link to determine acceptability.

Copies of the test results must be submitted. The removal and replacement of a segment of cable must be interpreted as the removal and replacement of a single contiguous length of cable connecting 2 splices and 2 connectors. The removal of a small section containing the failure and therefore introducing new unplanned splices will not be allowed.

86-2.20A(13) Fiber Optic Conduit and Innerduct Sealing Plugs

86-2.20A(13)(a) General

Except as otherwise noted, all fiber optic cable conduits must have their ends sealed with commercial preformed plugs which prevent the passage of gas, dust and water into these conduits . Sealing plugs must be installed within each splice vault, pull box, cabinet, or building.

Sealing plugs must be removable and reusable. .

Sealing plugs that seal the 4 inch fiber optic conduit must be with one self contained assembly having an adjustable resilient filler of polyurethane elastomer clamped between backing ends and compressed with stainless steel hardware.

Sealing plugs used to seal 4 inch fiber optic conduit must be capable of withstanding a pressure of 5 psi.

A sealing plug that seals an empty fiber optic conduit must have an eye or other type of capturing device (on the side of the plug that enters the conduit) to attach onto the pull tape, so the pull tape will be easily accessible when the plug is removed.

86-2.20B Materials

Not Used

86-2.20C Construction

Not Used

86-2.20D Payment

Not Used

APPENDIX A

Cable Verification Worksheet

*End-to-End Attenuation (Power Meter and Light Source) Testing
and OTDR Testing*

Contract No. _____ Contractor: _____

Operator: _____ Date: _____

Link Number: _____ Fiber Number: _____

Test Wavelength (Circle one): 1310 nm 1550 nm

Expected Location of fiber ends: End 1: _____ End 2: _____

Power Meter and Light Source Test Results:

Power In:	_____ dBm	1A
Output Power:	_____ dBm	1B
Insertion Loss [1A - 1B]:	_____ dB	1C

OTDR Test Results:

Forward Loss:	_____ dB	2A
Reverse Loss:	_____ dB	2B
Average Loss [(2A + 2B)/2]:	_____ dB	2C

To Be Completed by Caltrans:

Resident Engineer's Signature: _____

Cable Link Accepted: _____

Replace section 86-4.01D(1)(c)(ii) with:

86-4.01D(1)(c)(ii) Warranty

The manufacturer must provide a written warranty against defects in materials and workmanship for LED signal modules for a minimum period of 48 months after installation of LED signal modules. Replacement LED signal modules must be provided within 15 days after receipt of failed LED modules at your expense. The Department pays for shipping the failed modules to you. All warranty documentation must be submitted before installation. Replacement LED signal modules must be delivered to State Maintenance Electrical Shop at 1808 N. Batavia Street, Orange, CA 92865, Telephone (714) 974-3092.

Add to section 86-4.01D(2)(a):

LED signal module must be manufactured for 12-inch circular, 8-inch circular, arrow, and programmed visibility sections.

Replace section 86-4.03I(1)(c)(ii) with:

86-4.03I(1)(c)(ii) Warranty

The manufacturer must provide a written warranty against defects in materials and workmanship for LED PSF modules for a minimum period of 48 months after installation of LED PSF modules. Replacement LED PSF modules must be provided within 15 days after receipt of failed LED PSF modules at your expense. The Department pays for shipping the failed modules to you. All warranty documentation must be submitted before installation. Replacement LED PSF modules must be delivered to State Maintenance Electrical Shop at 1808 N. Batavia Street, Orange, CA 92865, Telephone (714) 974-3092.

Add to section 86-4.03I(2):

Installation of the LED PSF module into the pedestrian signal face only requires the removal of lenses, reflectors, lamps, and existing LED modules.

Replace 86-4.03J with:

86-4.03J Ramp Metering Sign - Light Emitting Diode

86-4.03J(1) General

86-4.03J(1)(a) Summary

This work includes installing LED "METER ON" in Type A modified pedestrian signal.

86-4.03J(1)(b) Submittals

Before shipping LED signal modules to job site, submit the following to the Transportation Laboratory:

1. Delivery form including district number, EA, and contact information
2. List containing all LED signal module serial numbers anticipated for use
3. LED signal modules

86-4.03J(2) Quality Assurance Testing

Module must be one listed on the Pre-Qualified Products List for LED traffic signals at:

http://www.dot.ca.gov/hq/esc/approved_products_list/pdf/led_traffic_signals.pdf

The Department will test LED signal module shipments per Normal Sampling Plan ANSI/ASQC Z1.4, Tables for Inspection by Attributes. Testing will be completed within 30 days of delivery to the Transportation Laboratory. LED signal modules tested or submitted for testing must be representative of typical production units. LED and circular LED signal modules will be tested as specified in California Test 604. Arrow, U-turn, and bicycle LED signal modules will be tested as specified in California Test 3001. All parameters of the specification may be tested on the modules. LEDs must be spread evenly across the module. LED arrow indication must provide the minimum initial luminous intensity listed. Measurements will be performed at the rated operating voltage of 120 V(ac).

Delays resulting from submittal of non-compliant materials do not relieve you from executing the contract within the allotted time. Non-compliant materials will be rejected. You must resubmit new LED for retesting and pick up the failed units within one week of notification. You must provide new LED signal modules and allow a minimum of 30 days for the retest. You must pay for all shipping and handling costs related to testing and retesting. Delays resulting from resubmittal and retesting are your responsibility and no extra time will be allowed.

After testing, you must pick up the tested LED signal modules from the Transportation Laboratory and deliver to the job site.

86-4.03J(2)(a) Warranty

You must provide the manufacturer's written warranty against defects in materials and workmanship for LED signal modules for a minimum period of 48 months after installation of LED signal modules. Replacement LED signal modules must be provided within 15 days after receipt of failed LED modules at no cost to the Department, except the cost of shipping the failed modules. All warranty documentation must be submitted before installation. Replacement LED signal modules must be delivered to Department Maintenance Electrical Shop at 1808 N. Batavia Street, Orange, CA 92865, Telephone (714) 974-3092.

86-4.03J(3) Materials

LED Meter on module must:

1. Be weather tight and connect directly to electrical wiring.
2. Be capable of optical unit replacement.
3. Have manufacturer's name, trademark, model number, serial number, lot number, month and year of manufacture, and required operating characteristics, including rated voltage, power consumption, and volt-ampere, permanently marked on the back of the module.
4. Be AlInGaP technology
5. Be ultra bright type rated for 100,000 hours of continuous operation from -40 to +74 degrees C
6. Each module must provide an average luminous intensity of at least 1,547 foot-lambert throughout the useful life over the operating temperature range.
7. The uniformity ratio of an illuminated symbol must not exceed 4 to 1 between the highest luminance area and the lowest luminance area in the module.
8. The color output of the module must conform to the requirements of Section 5.3 in the ITE Publication: Equipment and Material Standards, Chapter 3 (Pedestrian Traffic Control Signal Indications).
9. 'Meter On' must be lunar white with measured chromatic coordinates of LED module operating over a temperature range of -40 to +74 degrees C as follows:
 - 9.1 x: not less than 0.270, nor greater than 0.330
 - 9.2 y: not less than 1.055(x) - 0.0128, nor greater than 1.055(x) +0.0072

Lunar white color must be in conformance with the provisions in section 86-4.06.

10. Use LED as the light source.
11. Use required color and be ultra bright type rated for 100,000 hours of continuous operation from -40 to +74 degrees C.
12. Fit into Type A pedestrian signal modified so that the reflector must be a single chamber.
13. Be a single, self-contained device, not requiring on-site assembly for installation into standard Type A housing.
14. Module Identification
 - 14.1 Each module must have the manufacturer's name, trademark, model number, serial number, date of manufacture (month-year), and lot number as identification permanently marked on the back of the module.
 - 14.2 The following operating characteristics must be permanently marked on the back of the module: rated voltage and rated power in Watts and Volt-Ampere.
15. Maximum power consumption requirements for the LED modules are as follows (in Watts):

	25°C	74°C
"Meter On"	15.0	17.0

LED Meter on module must have an operational lifecycle rating of 48 months. During the operational lifecycle, LED signal module must meet all parameters of this specification.

Individual LEDs must be wired such that catastrophic loss or failure of one LED will result in loss of not more than 5 percent of the module light output. Failure of an individual LED in a string must not result in the loss of entire string or other indication.

No special tools for installation are allowed.

Wiring and terminal block must comply with Section 13.02 of ITE publication, Equipment and Material Standards, Chapter 2, "Vehicle Traffic Control Signal Heads." The LED module must be supplied with spade lugs and 3 secured, color-coded, 3-foot long, 600 V, 20 AWG minimum stranded jacketed copper wires. Wires must comply with NEC, rated for service at +105 degrees C.

LED Meter on module must operate:

1. At a frequency of 60 ± 3 Hz, over a voltage range from 95 to 135 V(ac), without perceptible flicker to the unaided eye. Fluctuations of line voltage must have no visible effect on luminous intensity of the indications. Rated voltage for measurements must be 120 V(ac).
2. Compatible with currently used State controller assemblies, including solid state load switches, flashers, and conflict monitors. Comply with TEES Chapters 3 and 6. If a 20 mA alternating current or less is applied to the unit, the voltage read across the 2 leads must be 15 V(ac) or less.

LED Meter on module on-board circuitry must:

1. Include voltage surge protection to withstand high-repetition noise transients. The voltage surge protection must comply with NEMA Standard TS2, Section 2.1.6.
2. Comply with FCC, Title 47, SubPart B, Section 15 regulations for Class A emission limits for electronic noise.

LED signal module must provide a power factor of 0.90 or greater.

Total harmonic distortion from current and voltage induced into an alternating current power line by LED signal module must not exceed 20 percent at an operating temperature of 25 degrees C.

When power is applied to LED signal module, light emission must occur within 90 ms.

Power supply must be integral to the module.

Internal components must be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

Lens and LED signal module material must comply with the ASTM specifications for that material.

Enclosures containing either the power supply or electronic components of LED signal module, except lenses, must be made of UL94VO flame-retardant material.

If a specific mounting orientation is required, the LED signal module must have prominent and permanent vertical markings for accurate indexing and orientation within the signal housing. Markings must include an up arrow, or the word "UP" or "TOP."

Lenses must be 3/16 inch, minimum thickness, clear acrylic or polycarbonate plastic or 1/8 inch nominal thickness glass fiber reinforced plastic, with molded, one piece, neoprene gasket. Message lettering for "METER" must be "Series C," 4-1/2 inches high, with uniform 1/2 inch stroke, and for "ON" must be "Series C," 6 inches high, with uniform one inch stroke. Letters must be clear, transparent or translucent, with black opaque background silk screened on to the second surface of the lens.

86-4.03J(4) Construction

Not Used

86-4.03J(5) Payment

Not Used

Add to section 86-5.01A(1):

Loop wire must be Type 2.

Loop detector lead-in cable must be Type C.

Slots must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

For Type E detector loops, sides of the slot must be vertical and the minimum radius of the slot entering and leaving the circular part of the loop must be 1-1/2 inches. Slot width must be a maximum of 5/8 inch. Loop wire for circular loops must be Type 2. Slots of circular loops must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

Add to Section 86-5.01:

86-5.01E RAMP METERING SYSTEM

86-5.01E(1) General

Maintain detection for the ramp meter systems by installing temporary detection equipment and solar power package and link to the controller assembly and equipment in the controller cabinet to allow the continued use of the ramp meter. The detection must work without changing the program of the controller unit. An example of temporary detection using the temporary Microwave Vehicle Detection is provided.

86-5.01E(2) Temporary Microwave Vehicle Detection System

This work consists of furnishing and installing a temporary microwave vehicle detection system (MVDS).

86-5.01E(2)(a) Materials List and Drawings

A list of materials that you propose to install for the temporary MVDS, together with the drawings and other data, must be submitted under section 86-1.04. Additionally, the following must be provided before the completion of the Contract:

1. Site Analysis Report - Before temporary MVDS installation, you must review each detection site and provide a written analysis recommending the optimum sensor placement for complying with the performance requirements of this special provision
3. Lane Configuration - The documentation must include a diagram that illustrates how the microwave beam is covering the traffic lanes as well as the temporary MVDS connector pins or wire terminals that correspond to the respective lanes. The lanes must be identified by direction (i.e., NB, SB, EB, WB) and in order with lane one being the lane nearest to the center of the roadway.
4. Mounting and Wiring Information - You must provide for authorization 1 set of detailed diagrams showing wiring and service connections for each temporary MVDS. The authorized diagrams must be covered separately on each side with clear self-adhesive plastic and placed in a heavy-duty plastic envelope. The envelope must be attached securely to the inside of the cabinet door or at a location ordered.
5. Communication Protocol - The MVDS communication protocol must be open and must be freely available for use in the public domain. The documentation consists of a message structure organization, data packet length, and all information necessary to make use of the messages.
6. Remote Programming - You must provide all information and software necessary for operating the system from a remote Windows XP/7-based or newer PC. This information and software must include at a minimum the capability to calibrate, tune, align, and program the temporary MVDS and be provided on a CD compatible with Windows XP/7 -based or newer PC. The information must be formatted so the files can be matched with the equipment being calibrated or aligned. This documentation must contain files that allow for replacement equipment to be loaded with the same configuration.
7. Temporary MVDS Accuracy Analysis - You must be responsible for conducting temporary MVDS Performance Testing and must submit an temporary MVDS accuracy analysis that complies with the requirements of the special provisions within 15 days of temporary MVDS testing. The original video recordings as well as DVD or CD copies of the video images covering the analysis periods must be included.

8. Acceptance Testing Documentation - You must provide a test plan including the time and the period of the testing to be authorized. The test plan must be organized to allow the Engineer to perform acceptance testing by using the documentation and without assistance from you. You must collect and submit the data to be certified. If requested, the data must be collected in the presence of the Engineer.
9. Acceptance Testing Schedule - You must submit a testing schedule for authorization 15 days before acceptance testing of the temporary MVDS. If the testing period extends beyond the normal working shift or if you fail to provide the necessary material for the testing within 1 hour of the scheduled testing start time, the Engineer may cancel the testing for the day.

86-5.01E(2)(b)–Functional Requirements

Temporary MVDSs must simultaneously provide vehicle detection data in the form of vehicle presence, volumes, counts, speed, classification, and occupancy for a minimum of 8 lanes of traffic and must comply with the performance requirements of the special provisions. Temporary MVDSs must provide a separate zone per lane and detect vehicles as close as 9.8feet and as far as 197 feet from the temporary MVDS sensor. Temporary MVDSs must monitor traffic lanes in the presence of barrier railings, guard railings, and other obstacles.

MVDSs must comply with the following detection performance criteria when installed at a minimum of 9.8 feet from the nearest lane and at a minimum height of 16.4 feet above the roadway detection zone:

1. Average 5-minute volumes for all lanes combined with better than 95-percent accuracy compared to vehicles observed in video images for the same period for any 15-minute period selected by the Engineer.
2. Average 30-second volumes in every lane with better than 90-percent accuracy compared to vehicles observed in video images for the same period for any 5-minute period selected by the Engineer.
3. Average 30-second speed in any lane with better than 95-percent accuracy for any 5-minute period selected by the Engineer.
4. Average 5-minute occupancy for any lane with better than 85-percent accuracy for any 15-minute period selected by the Engineer.
5. Count accuracy, when compared to vehicles observed in video images for the same period, must be not less than 90 percent for any lane and not less than 95 percent for all lanes combined.
6. Average 15-minute classification according to user-defined criteria with better than 90-percent accuracy compared to vehicles observed in video images for the same period. Vehicle or length classification must be provided for categories of small car, average car, mid size car, long car, and extra-long car that are user definable by either length parameters, minimum length to maximum length for the category, or by a multiple of length of the average car.
7. You must provide the criteria for speed and volume acceptance testing for authorization. You must also provide speed and volume data for verification.

Temporary MVDS must consist of a sensor unit and include all required mounting hardware, power supplies, surge suppression, cables, connectors, and wiring. The temporary MVDS sensor must include, as a minimum, a directional microwave transmitter, antenna, microwave receiver, processor, memory, and communication interface.

The temporary MVDS must have an TIA-232 and TIA-485 communication port that supports the National Transportation Communication for ITS Protocol (NTCIP). The temporary MVDS communication protocol must be nonproprietary and openly specified and available for use in the public domain. The temporary MVDS must be addressable and must download count, speed, and occupancy data when polled by the traffic management center computer. Speed must be configurable in U.S. customary units. The temporary MVDS must support unit setup from a serial console port on the temporary MVDS unit. The console port protocol must support sensor unit setup from a local Windows XP/7 or newer compatible laptop or from a remote location with a desktop computer and standard phone modem.

When temporary MVDS sensor contact outputs will be connected to Model 170E/2070 controller to emulate inductive loops, comply with the following:

1. The temporary MVDS sensors must be connected to a microwave sensor interface card (MSIF) installed in the input file of a Department-furnished Model 170E or Model 2070 controller cabinet.

2. Each detection zone must provide an optically isolated relay contact pair that follows the presence of vehicles in every traffic lane and sends signals to the controller with the accuracy stated in the special provisions.
3. The MSIF must have indications for power, communication, and the real-time operation of each detection contact output.

Temporary MVDSs must be user programmable in the field via the MVDS unit console port with a Windows XP/7 or newer compatible laptop computer. You must provide software, firmware, and equipment to set up, calibrate, and operate the unit. Temporary MVDS software must observe the vehicular traffic and automatically place detection lanes and set the sensor sensitivity. Temporary MVDSs must be designed so a trained Department employee can configure and calibrate the temporary MVDS in less than 15 minutes per lane once the temporary MVDS sensor unit is installed.

86-5.01E(2)(c) Technical Requirements

Temporary MVDSs must be FCC certified under part 15 regulations for low power, unlicensed, continuous radio transmitter operation. The temporary MVDS must comply with FCC regulations for all specified operating conditions and over the expected life of the temporary MVDS.

Temporary MVDS sensor unit must not weigh more than 15 pounds. The temporary MVDS must operate over a temperature range from – 40 degrees F to + 165 degrees F, with up to 95 percent relative humidity. The temporary MVDS sensor enclosure must be weatherproof with a NEMA 4R rating and the sensor mounted and directed perpendicular to the flow of traffic lanes at the locations shown.

All electronic assemblies must comply with the specifications in chapters 1 and 5 of the TEES.

The MSIF must be inserted into the controller input file slots using the edge connector to obtain limited 24 V(dc) power and to provide contact closure outputs. No rewiring to the Model 170E or Model 2070 cabinet must be allowed. The MSIF must comply with the specifications in chapter 1 as well as sections 5.2.8, 5.2.8.1, 5.2.8.2, 5.4.1, 5.4.5, 5.4.5, and 5.4.6, 5.5.1, 5.5.5, and 5.5.6 of TEES.

Temporary MVDS sensors must be wired with a connectorized cable harness. Cables must run continuously without splices between the sensor and controller cabinet and terminate in labeled terminal blocks identified with the purpose served . The connector must be a standard mil type and rated plug. The cable must have the number of conductors specified by the temporary MVDS manufacturer to support the number of detection zones shown plus spares for 2 future zones with an overall shield and copper drain wire. Conductors must be stranded copper equal to or exceeding the minimum strands and wire dimensions specified by the temporary MVDS manufacturer for the wiring distance involved and covered with a minimum 12 mils polyvinyl chloride (PVC) insulation rated for 300 V at 221 degrees F. The outer jacket must be chrome PVC with minimum thickness of 53 mils and the outside diameter of the cable must not exceed 3/4 inch. A minimum of 6.5-foot slack of MVDS cable must be coiled at the bottom of the controller cabinet. Slack in other cabinets must be as shown or as ordered.

You must wire the temporary MVDS power conductors to DIN-rail rack-mounted . The serial data communication output conductors must be terminated at TB-0 and continue for a minimum of 9.8 feet to a DE-9F connector for setup-. The ends of unused and spare conductors must be coiled and taped to prevent accidental contact to other circuits. Conductors inside the cabinet must be labeled for the functions as shown on the authorized detailed diagrams.

Field terminated circuits must include transient protection that complies with IEEE Standard 587 Category C.

The temporary MVDS must automatically restore normal operation following a power failure within 3 minutes and not require manual intervention. The temporary MVDS must maintain the configuration and calibration information in nonvolatile memory and retain the information while powered off for at least 90 days.

The temporary MVDS must be configurable for 30-second to 24-hour polling cycles and store vehicle count, speed, classification, and occupancy data in 10-second to not less than 15-minute intervals.

The temporary MVDS must be tested and in standard production for a minimum of 3 months. You must not install any temporary MVDS older than 6 months from the scheduled start date of the temporary MVDS installation as indicated by date codes or serial numbers of electronic circuit assemblies.

The temporary MVDS system and all supporting equipment must be designed to operate continuously in an outdoor traffic monitoring and control environment. You must provide a manufacturer's warranty stating that the manufacturing quality and electronic components must support a "mean time between failure" of 10 years in this environment.

86-5.01E(2)(d) Construction

You must assure that the temporary MVDS will not cause harmful interference to radio communication in the area of the installation as required by FCC part 15 regulation. The temporary MVDS units must be installed such that each unit operates independently and does not interfere with other temporary MVDS units or other equipment in the vicinity.

You are responsible for site visits and analysis of each proposed pole location to assure that the detector placement will comply with the manufacturer's published installation instructions and the performance required in the special provisions. You must confirm detector placement with the manufacturer before performing work at the temporary MVDS location. Whenever the manufacturer's analysis requires a change in the proposed pole location, you must arrange a meeting with the manufacturer and the Engineer to select a new pole location.

You must not proceed with any temporary MVDS installation until the pole location is authorized.

You must be responsible for the compatibility of components and for making necessary calibration adjustment to deliver the performance required in the special provisions. You must provide equipment required to set up, calibrate, verify performance, and maintain the temporary MVDS.

You must provide programming software needed to support the temporary MVDS. The software must be installed in the appropriate equipment and used for the acceptance testing.

86-5.01E(2)(e) Testing

Accuracy of the temporary MVDS system must be verified by comparing the temporary MVDS vehicle counts to recorded video image counts for the same period. The video camera must be located and oriented so that traffic is visible in all lanes. Video images must be time stamped and analysis periods recorded to a DVD or CD media for viewing on a PC. The video field of view must totally encompass the area in which vehicles are detected. You must provide a means for synchronizing the test starting and ending times or provide software that displays time stamped MVDS data along with the video images of the moving vehicles. You must provide the original recording medium and documentation that supports the accuracy analysis and make a copy of these materials for their own use.

The accuracy test must take place during a complex traffic period as specified. The following video recording and analysis options that depend on the available traffic conditions are acceptable; however the heaviest expected traffic conditions should be used, if possible:

1. The minimum recording period must be 30 minutes when the recording includes congested traffic (vehicles traveling at less than 20 mph for five or more minutes in any lane).
2. The minimum recording period must be 45 minutes when the traffic flow exceeds 1500 vehicles per hour in any lane during the test period.
3. The minimum recording period must be 60 minutes when the flow is less than 1500 vehicles per hour in every lane.

The analysis must be based on a minimum of 100 detected vehicles in every lane and cover the same time period for all lanes. The time period within the selected video will be selected by the Engineer. The total vehicle count for every lane must be used and include the first and last partial vehicles for each lane. Errors in the start and finish of the temporary MVDS and manual counts are included in the performance criterion specified in the special provisions.

Temporary MVDS unit count must be compared to the vehicle counts under these traffic conditions. Vehicles licensed for use on State roads must be counted by the temporary MVDS. The data accuracy must be determined by the formula $100\{1-[(TC-MC)/TC]\}$, where TC=traffic count derived from the media recording, MC=MVDS-reported count over the same period of time, and the resulting fraction is expressed as an absolute value.

The accuracy of each temporary MVDS unit must be determined and documented so each unit may be authorized or rejected separately by the Engineer. Failure to submit the materials at the conclusion of

testing invalidates the test. The recorded media serves as acceptance evidence and must not be used for calibration. The calibration must have been completed before testing and verification.

The Engineer will review the accuracy data findings and accept or reject the results within 15 days. Determination of vehicle anomalies or unusual occurrences will be decided by the Engineer. Data or counts that are not accepted must be considered errors and count against the temporary MVDS unit's calibration. If the Engineer finds that the temporary MVDS does not comply with the performance requirements, you must recalibrate and retest the unit and resubmit new test data within 10 days. Following 3 failed attempts, you must replace the temporary MVDS detector with a new unit.

In addition to the accuracy analysis performed by you, you must provide equipment, software, documentation, support equipment, and any other materials, personnel, and devices that may be required for acceptance testing. You must notify the Engineer 15 days before the MVDS unit is ready for acceptance testing. Testing must be scheduled to be accomplished before the end of the normal work shift.

86-5.01E(2)(g) Removal

When no longer required, as determined by the Engineer, temporary MVDS must be removed.

Remove the temporary MVDE when directed.

86-5.01E(2)(h) Photovoltaic Power Supply for Temporary MVDS

Each Photovoltaic (PV) power supply for temporary MVDS must include a panel support structure, photovoltaic panels, batteries, a load/charge controller, a NEMA enclosure and components as shown and in conformance with these special provisions.

86-5.01E(2)(h)(i) General

The PV power supply for temporary MVDS must consist of components designed for outdoor use and approved by the Underwriters Laboratory.

Each PV power supply for temporary MVDS must be designed to provide 12 V(dc) to the MVDS System 24 hours per day and must be capable of operating four days without additional charge from the PV panels. A load/charge controller must charge the batteries during daytime while providing 12 V(dc) to the temporary MVDS System 24 hours per day. A panel support structure must be furnished and installed to securely fasten the PV panels to the standard or pole as shown.

The PV power supply for temporary MVDS must be designed to operate in ambient air temperatures from 14 to 140 degrees F.

Each PV Power Supply for temporary MVDS must include the following items:

Item	Quantity
Panel support structure	1
Photovoltaic panels	2
Batteries	2
Load/charge controller	1
NEMA enclosure	1

86-5.01E(2)(h)(ii) Panel Support Structure

The panel support structure must hold the PV panels securely on the standard or pole at the angle shown. The PV panels must be oriented directly south to maximize the collection of solar energy. The PV panels are mounted on a system with engineering drawings indicating they will withstand winds of 100 mph.

86-5.01E(2)(h)(iii) Photovoltaic Panels

Each Photovoltaic (PV) Panel must meet the following requirements:

Parameter	Minimum requirements
Peak power output *	85 +10percent /- 5 percent watts **
Voltage at maximum power	17.4 V(dc) **
Current at maximum power	5.0 A **
Weight	18.0 lbs**
Dimensions	as shown
Hailstone impact resistance	1" diameter at 50 mph
Operating temperature range	14 to 150 degrees F min range

* Standard Test Conditions identified a: Irradiance = 93 W/square foot, cell temperature = 77 degrees F, solar spectral irradiance per ASTM E892 (air mass = 1.5)

** Minimum requirements are based on a 85 watt PV panel. Higher wattage PV panels up to and including peak power output of 100 watts are acceptable. The PV panels must contain single crystal or multi crystal technology for greatest efficiency and longest life. The cells must be textured and coated with an anti reflective film. These cells must be provided with multiple redundant contacts and must be electrically matched for increased efficiency. A rugged aluminum vented backing must be riveted to a aluminum panel equipped with welded aluminum brackets for attachment to the bracket arm. The PV panel assembly must pass salt tests to Mil-standard 810 and the panel assembly must provide electrical grounding of all metal surfaces. The PV panel must carry a minimum 20 year power warranty. Stainless steel hardware must be used.

86-5.01E(2)(h)(iv) Batteries

Batteries must be maintenance free, sealed, absorbed glass mat, deep cycle, heavy duty. Each battery must meet the following requirements:

Parameter	Minimum requirements
Voltage	12 V(dc)
Storage capacity	97 A h minimum at a 100 hour discharge rate
Maximum discharge current for 5 seconds	500 A minimum

86-5.01E(2)(h)(v) Load/Charge Controller

Each load/charge controller must regulate the voltage and current coming from the solar panels going to the batteries and to the load (MVDS components).

Each load/charge controller must meet the following minimum requirements:

Parameter	Minimum requirements
Rated solar current	15 A
Rated load current	15 A
System voltage	12 / 24 V(dc)
Digital meter	Displays battery voltage, solar current and load current
Connections	Screw terminals for solar PV panels, battery and load
LED indicators	Charging, battery status and temperature sensor
Load disconnect switch	Can disconnect the load or both the load and solar
Self-test	Tests all load/charge controller internal circuits.

86-5.01E(2)(h)(vi) NEMA Enclosure

Each NEMA enclosure must be the type and size shown. The NEMA enclosure must house the equipment shown.

86-5.01E(2)(h)(vii) Submittals

Submittals for the PV power supply for temporary MVDS must comply with section 86-1.04 . Submittals must be delivered at least 15 working days before installation at the project sites. The Engineer must be allowed 5 working days for the review of the submittals. The submittals must include cutsheets for all proposed electrical components required for a PV power supply for temporary MVDS.

Initial site analysis, set up and configuration of the system, calibration of the device performance, verification of detector accuracy, is included in the temporary detection system.

86-5.01E(38) Payment

Payment for temporary detection system is included in the payment for the various locations shown and no separate payment will be made therefor.

Add to Section 86-5.01:

86-5.01F Traffic Monitoring Station

86-5.01F(1) General

Maintain detection for the traffic monitoring station by installing temporary detection equipment and solar power package and link to the controller assembly and equipment in the controller cabinet to allow the continued use of the traffic monitoring station. The detection must work without changing the program of the controller unit. An example of temporary detection using the temporary Microwave Vehicle Detection is provided.

86-5.01F(2) Temporary Microwave Vehicle Detection System

This specification for Temporary Microwave Vehicle Detection System is specified in section 86-5.01E in these special provisions.

Replace the 1st sentence of the 1st paragraph of section 86-5.02 and the 5th paragraph of section 86-5.02 with:

Housing must be either (1) die-cast aluminum, (2) permanent mold-cast aluminum, or (3) UV-stabilized, self-extinguishing structural plastic type. Pedestrian push button signs must be porcelain-enameled metal for aluminum housing and structural plastic for plastic housing. Plastic housing must match color no. 17038, 27038, or 37038 of FED-STD-595 and colored throughout.

Replace section 86-6.01 with:

86-6.01 LED LUMINAIRES

86-6.01A General

86-6.01A(1) Summary

Section 86-6.01 includes specifications for installing LED luminaires.

86-6.01A(2) Definitions

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

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

house side lumens: Lumens from a luminaire directed to light up areas between the fixture and the pole (e.g., sidewalks at intersection or areas off of the shoulders on freeways).

International Electrotechnical Commission (IEC): Organization that prepares and publishes international standards for all electrical, electronic and related technologies.

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 initial values.

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

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

National Voluntary Laboratory Accreditation Program (NVLAP): U.S. DOE program that accredits independent testing laboratories to qualify.

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

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

surge protection device (SPD): Subsystem or component that can protect the unit against short duration voltage and current surges.

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.

86-6.01A(3) Submittals

Submit a sample luminaire to METS for testing after the manufacturer's testing is completed. Include the manufacturer's testing data.

Product submittals must include:

1. LED luminaire checklist.
2. Product specification sheets, including:
 - 2.1. Maximum power in watts.
 - 2.2. Maximum designed junction temperature.
 - 2.3. Heat sink area in square inches.
 - 2.4. Designed junction to ambient thermal resistance calculation with thermal resistance components clearly defined.
 - 2.5. L70 in hours when extrapolated for the average nighttime operating temperature.
3. IES LM-79 and IES LM-80 compliant test reports from a CALiPER-qualified or NVLAP-approved testing laboratory for the specific model submitted.
4. Photometric file based on LM-79 test report.
5. Initial and depreciated isofootcandle diagrams showing the specified minimum illuminance for the particular application. The diagrams must be calibrated to feet and show a 40 by 40 foot grid. The diagrams must be calibrated to the mounting height specified for that particular application. The depreciated isofootcandle diagrams must be calculated at the minimum operational life.
6. Test report showing SPD performance as tested under ANSI/IEEE C62.41.2 and ANSI/IEEE C62.45.
7. Test report showing mechanical vibration test results as tested under California Test 611 or equal.
8. Data sheets from the LED manufacturer that include information on life expectancy based on junction temperature.
9. Data sheets from the power supply manufacturer that include life expectancy information.

Submit documentation of a production QA performed by the luminaire manufacturer that ensures the minimum performance levels of the modules comply with the section 86-6.01 specifications and includes a documented process for resolving problems. Submit documentation as an informational submittal.

Submit warranty documentation as an informational submittal before installing LED luminaires.

86-6.01A(4) Quality Control and Assurance

86-6.01A(4)(a) General

The Department may perform random sample testing on the shipments. The Department completes testing within 30 days after delivery to METS. Luminaires are tested under California Test 678. All parameters specified in section 86-6.01 specifications may be tested on the shipment sample. When testing is complete, the Department notifies you. Pick up the equipment from the test site and deliver to the job site.

One sample luminaire must be fitted with a thermistor or thermo-couple temperature sensor. A temperature sensor must be mounted on the LED solder pad as close to the LED as possible. A temperature sensor must be mounted on the power supply case. Light bar or modular systems must have 1 sensor for each module mounted as close to the center of the module as possible. Other configurations must have at least 5 sensors per luminaire. Contact METS for advice on sensor location. Thermocouples must be either Type K or C. Thermistors must be a negative temperature coefficient type with a nominal resistance of 20 k Ω . The appropriate thermocouple wire must be used. The leads must be a minimum of 6 feet. Documentation must accompany the test unit that details the type of sensor used.

The sample luminaires must be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +70 degrees F before performing any testing.

The luminaire lighting performance must be depreciated for the minimum operating life by using the LED manufacturer's data or the data from the LM-80 test report, whichever results in a higher lumen depreciation.

Failure of the luminaire that renders the unit noncompliant with section 86-6.01 specifications is cause for rejection. If a unit is rejected, allow 30 days for retesting. The retesting period starts when the replacement luminaire is delivered to the test site.

If a luminaire submitted for testing does not comply with section 86-6.01, remove the unit from METS within 5 business days after notification the unit is rejected. If the unit is not removed within that period, the Department may ship the unit to you and deduct the cost.

86-6.01A(4)(b) Warranty

Furnish a 7-year replacement warranty from the manufacturer of the luminaires against any defects or failures. The effective date of the warranty is the date of installation. Furnish replacement luminaires within 10 days after receipt of the failed luminaire. The Department does not pay for the replacement. Deliver replacement luminaires to the following department maintenance electrical shop:

Caltrans Maintenance Yard
1808 N. Batavia
Orange, CA 92865

86-6.01B Materials

86-6.01B(1) General

The luminaire must include an assembly that uses LEDs as the light source. The assembly must include a housing, an LED array, and an electronic driver. The luminaire must:

1. Be UL listed under UL 1598 for luminaires in wet locations or an equivalent standard from a recognized testing laboratory
2. Have a minimum operational life of 63,000 hours
3. Operate at an average operating time of 11.5 hours per night
4. Be designed to operate at an average nighttime operating temperature of 70 degrees F
5. Have an operating temperature range from -40 to +130 degrees F
6. Be defined by the following application:

Application	Replaces
Roadway 1	200 Watt HPS mounted at 34 ft
Roadway 2	310 Watt HPS mounted at 40 ft
Roadway 3	310 Watt HPS mounted at 40 ft with back side control
Roadway 4	400 Watt HPS mounted at 40 ft

The individual LEDs must be connected such that a catastrophic loss or a failure of 1 LED does not result in the loss of more than 20 percent of the luminous output of the luminaire.

86-6.01B(2) Luminaire Identification

Each luminaire must have the following identification permanently marked inside the unit and outside of its packaging box:

1. Manufacturer's name
2. Trademark
3. Model no.
4. Serial no.
5. Date of manufacture (month-year)
6. Lot number
7. Contract number
8. Rated voltage
9. Rated wattage
10. Rated power in VA

86-6.01B(3) Electrical Requirements

The luminaire must operate from a 60 ± 3 Hz AC power source. The fluctuations of line voltage must have no visible effect on the luminous output. The operating voltage may range from 120 to 480 V(ac). The luminaire must operate over the entire voltage range or the voltage range must be selected from either of the following options:

1. Luminaire must operate over a voltage range of 95 to 277 V(ac). The operating voltages for this option are 120 V(ac) and 240 V(ac).
2. Luminaire must operate over a voltage range of 347 to 480 V(ac). The operating voltage for this option is 480 V(ac).

The power factor of the luminaire must be 0.90 or greater. The total harmonic distortion, current and voltage, induced into an AC power line by a luminaire must not exceed 20 percent. The maximum power consumption allowed for the luminaire must be as shown in the following table:

Application	Maximum consumption (Watts)
Roadway 1	165
Roadway 2	235
Roadway 3	235
Roadway 4	300

86-6.01B(4) Surge Suppression and Electromagnetic Interference

The luminaire on-board circuitry must include an SPD to withstand high repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The SPD 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 SPD must comply with UL 1449. The SPD performance must be tested under ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.

The luminaires and associated on-board circuitry must comply with the Class A emission limits provided in 47 CFR 15, subpart B concerning the emission of electronic noise.

86-6.01B(5) Compatibility

The luminaire must be operationally compatible with currently used lighting control systems and photoelectric controls.

86-6.01B(6) Photometric Requirements

The luminaire must maintain a minimum illuminance level throughout the minimum operating life. The L70 of the luminaire must be the minimum operating life or greater. The measurements must be calibrated to standard photopic calibrations. The minimum maintained illuminance values measured at a point must be as shown in the following table:

Application	Mounting height (ft)	Minimum maintained illuminance (fc)	Light pattern figure (isofootcandle curve)
Roadway 1	34	0.15	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 2	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern.</p>
Roadway 3	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1$ <p>for $y \geq 0$ (street side)</p> <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.</p>

Roadway 4	40	0.2	<p>Pattern defined by an ellipse with the equation:</p> $\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1$ <p>where: x = direction longitudinal to the roadway y = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.</p>
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The luminaire must have a correlated color temperature range from 3,500 to 6,500 K. The color rendering index must be 65 or greater.

The luminaire must not allow more than:

1. 10 percent of the rated lumens to project above 80 degrees from vertical
2. 2.5 percent of the rated lumens to project above 90 degrees from vertical

86-6.01B(7) Thermal Management

The passive thermal management of the heat generated by the LEDs must have enough capacity to ensure proper operation of the luminaire over the minimum operation life. The LED maximum junction temperature for the minimum operation life must not exceed 221 degrees F.

The junction-to-ambient thermal resistance must be 95 degrees F per watt or less. The use of fans or other mechanical devices is not allowed. The heat sink material must be aluminum or other material of equal or lower thermal resistance.

The luminaire must contain circuitry that automatically reduces the power to the LEDs to a level that ensures the maximum junction temperature is not exceeded when the ambient outside air temperature is 100 degrees F or greater.

86-6.01B(8) Physical and Mechanical Requirements

The luminaire must be a single, self-contained device, not requiring job site assembly for installation. The power supply for the luminaire is integral to the unit. The weight of the luminaire must not exceed 35 lb. The maximum effective projected area when viewed from either side or either end must be 1.4 sq ft. The housing color must match a color no. from 26152 to 26440 or from 36231 to 36375, or color no. 36440 of FED-STD-595.

The housing must be fabricated from materials designed to withstand a 3,000-hour salt spray test under ASTM B 117. All aluminum used in housings and brackets must be of a marine grade alloy with less than 0.2 percent copper. All exposed aluminum must be anodized.

Each refractor or lens must be made from UV-inhibited high impact plastic such as acrylic or polycarbonate or heat- and impact-resistant glass and be resistant to scratching. Polymeric materials except lenses of enclosures containing either the power supply or electronic components of the luminaire must be made of UL94VO flame retardant materials. Paint or powder coating of the housing must comply with section 86-2.16. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

Each housing must be provided with a slip fitter capable of mounting on a 2-inch pipe tenon. This slip fitter must fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches. The slip fitter must be capable of being adjusted a minimum of ±5 degrees from the axis of the tenon in a minimum of five steps: +5, +2.5, 0, -2.5, -5. The clamping brackets of the slip fitter must not bottom out on the housing bosses when adjusted within the designed angular range. No part of the slip fitter mounting brackets on the luminaires must develop a permanent set in excess of 1/32 inch when the two or four 3/8-inch diameter cap screws used for mounting are tightened to 10 ft-lb. Two sets of cap screws may be furnished to allow the slip fitter to be mounted on the pipe tenon in the acceptable range without the cap screws bottoming out in the threaded holes. The cap screws and the clamping brackets must be made of corrosion resistant

materials or treated to prevent galvanic reactions and be compatible with the luminaire housing and the mast arm.

The assembly and manufacturing process for the LED luminaire must be designed to ensure internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. When tested under California Test 611, the luminaire to be mounted horizontally on the mast arm must be capable of withstanding the following cyclic loading for a minimum of 2 million cycles without failure of any luminaire part:

Cyclic Loading		
Plane	Power supply	Minimum peak acceleration level
Vertical	Installed	3.0 g peak-to-peak sinusoidal loading (same as 1.5 g peak)
Horizontal ^a	Installed	1.5 g peak-to-peak sinusoidal loading (same as 0.75 g peak)

^aPerpendicular to the direction of the mast arm

The housing must be designed to prevent the buildup of water on top of the housing. Exposed heat sink fins must be oriented to allow water to freely run off of 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 ANSI/IEC rating of IP66. The power supply enclosure must be protected to at least an ANSI/IEC rating of IP43.

Each mounted luminaire must be furnished with an ANSI C136.10-compliant, locking type photocontrol receptacle and a rain tight shorting cap. The receptacle must comply with section 86-6.11A.

When the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door must be secured to the housing such that accidental opening is prevented. A safety cable must mechanically connect the door to the housing.

Field wires connected to the luminaire must terminate on a barrier type terminal block secured to the housing. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6. Each terminal position must be clearly identified.

The power supply must be rated for outdoor operation and have at least an ANSI/IEC rating of IP65.

The power supply must be rated for a minimum operational life equal to the minimum operational life of the luminaire or greater.

The power supply case temperature must have a self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.

The power supply must have 2 leads to accept standard 0-10 V(dc). The dimming control must be compatible with IEC 60929. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.

Conductors and terminals must be identified.

Replace "Reserved" in section 86-6.10D with:

Model 500 LED changeable message sign (CMS) system consists of a Model 500 LED changeable message sign, a Model 170E controller assembly in a completely wired Model 334LC cabinet with the required wiring, and auxiliary equipment required to control the CMS described.

The Model 500 LED changeable message sign, wiring harness, and Model 170E controller assembly including controller unit and completely wired cabinet, but without anchor bolts, is Department-furnished.

Install the sign assembly on the sign structure. Construct the controller cabinet foundation as shown for a Model 334LC cabinet, including furnishing and installing anchor bolts. Install the controller cabinet on the foundation and connect the field wiring to the terminal blocks in the sign assembly and in the controller cabinet.

2. Steel slag

87-2.02 MATERIALS

87-2.02A General

Do not use air-cooled iron blast furnace slag to produce aggregate for:

1. Structure backfill material
2. Pervious backfill material
3. Permeable material
4. Reinforced or prestressed PCC component or structure

Do not use aggregate produced from slag resulting from a steel-making process except in:

1. Imported borrow
2. AS
3. Class 2 AB
4. HMA

Steel slag used to produce aggregate for AS and Class 2 AB must be crushed such that 100 percent of the material will pass a 3/4-inch sieve and then control aged for at least 3 months under conditions that will maintain all portions of the stockpiled material at a moisture content in excess of 6 percent of the dry weight of the aggregate.

For steel slag aggregate, provide separate stockpiles for controlled aging of the slag. An individual stockpile must not contain less than 10,000 tons or more than 50,000 tons of slag. The material in each individual stockpile must be assigned a unique lot number, and each stockpile must be identified with a permanent system of signs. Maintain a permanent record of:

1. Dates for:
 - 1.1. Completion of stockpile
 - 1.2. Start of controlled aging
 - 1.3. Completion of controlled aging
 - 1.4. Making of tests
2. Test results

For each stockpile of steel slag aggregate, moisture tests must be made at least once each week. The time covered by tests that show a moisture content of 6 percent or less is not included in the aging time.

Notify METS and the Engineer upon completion of each stockpile and the start of controlled aging and upon completion of controlled aging. Do not add aggregate to a stockpile unless a new aging period is started.

Steel slag used for imported borrow must be weathered for at least 3 months.

Each delivery of aggregate containing steel slag for AS or Class 2 AB must include a delivery tag for each load. The tag must identify the lot by the stockpile number, slag aging location, and stockpile completion and controlled aging start date.

You may blend air-cooled iron blast furnace slag or natural aggregate in proper combinations with steel slag aggregate to produce the specified gradings.

California Test 202 is modified by California Test 105 whenever the difference in sp gr between the coarse and fine portions of the aggregate or between the blends of different aggregates is 0.2 or more.

For slag used as aggregate in HMA, the Kc factor requirements in California Test 303 do not apply.

If steel slag aggregates are used to produce HMA, no other aggregates may be used in the mixture except that up to 50 percent of the material passing the no. 4 sieve may consist of iron blast furnace slag aggregates, natural aggregates, or a combination of these. If iron blast furnace aggregates, natural aggregates, or a combination of these are used in the mixture, each aggregate type must be fed to the drier at a uniform rate. Maintain the feed rate of each aggregate type within 10 percent of the amount set. Provide adequate means for controlling and checking the feeder accuracy.

Physical property	Requirement
Particle size distribution Less than 45 microns Less than 10 microns	95 percent 50 percent
Strength activity index with portland cement ^b 7 days 28 days	95 percent (min percent of control) 110 percent (min percent of control)
Expansion at 16 days when testing project materials under ASTM C 1567 ^c	0.10 percent max
Surface area when testing by nitrogen adsorption under ASTM D 5604	40.0 m ² /g min

^aSiO₂ in crystalline form must not exceed 1.0 percent.

^bWhen tested under AASHTO M 307 for strength activity testing of silica fume.

^cIn the test mix, Type II or V portland cement must be replaced with at least 12 percent rice hull ash by weight.

For the purpose of calculating the equations for the cementitious material specifications, consider rice hull ash to be represented by the variable *UF*.

**REVISED STANDARD SPECIFICATIONS
APPLICABLE TO THE 2010 EDITION
OF THE STANDARD SPECIFICATIONS**

REVISED STANDARD SPECIFICATIONS PUBLISHED ON 07-27-12

Revised standard specifications are under headings that correspond with the main-section headings of the *Standard Specifications*. A main-section heading is a heading shown in the table of contents of the *Standard Specifications*. A date under a main-section heading is the date of the latest revision to the section.

Each revision to the *Standard Specifications* begins with a revision clause that describes a revision to the *Standard Specifications* or introduces a revision to the *Standard Specifications*. For a revision clause that describes a revision, the date on the right above the clause is the publication date of the revision. For a revision clause that introduces a revision, the date on the right above a revised term, phrase, clause, paragraph, or section is the publication date of the revised term, phrase, clause, paragraph, or section. For a multiple-paragraph or multiple-section revision, the date on the right above a paragraph or section is the publication date of the paragraphs or sections that follow.

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

DIVISION I GENERAL PROVISIONS

1 GENERAL

06-20-12

Replace "current" in the 2nd paragraph of section 1-1.05 with:

most recent

04-20-12

Add to the 4th paragraph of section 1-1.05:

04-20-12

Any reference directly to a revised standard specification section is for convenience only. Lack of a direct reference to a revised standard specification section does not indicate a revised standard specification for the section does not exist.

Delete the abbreviation and its meaning for *UDBE* in the 1st table of section 1-1.06.

06-20-12

Add to section 1-1.07B:

06-20-12

Disadvantaged Business Enterprise: Disadvantaged Business Enterprise as defined in 49 CFR 26.5.

Replace "PO BOX 911" in the District 3 mailing address in the table in section 1-1.08 with:

703 B ST

04-20-12

5 CONTROL OF WORK

07-20-12

Replace the 1st and 2nd sentences in the 7th paragraph of section 5-1.13B(1) with:

06-20-12

If a DBE is decertified before completing its work, the DBE must notify you in writing of the decertification date. If a business becomes a certified DBE before completing its work, the business must notify you in writing of the certification date.

Replace "90" in the last sentence of the 7th paragraph of section 5-1.13B(1) with:

06-20-12

30

Replace "Underutilized" in "Underutilized Disadvantaged Business Enterprises" in the heading of section 5-1.13B(2) with:

06-20-12

Performance of

Delete *U* in *UDBE* at each occurrence in section 5-1.13B(2).

06-20-12

Replace the 3rd paragraph of section 5-1.13B(2) with:

06-20-12

Do not terminate or substitute a listed DBE for convenience and perform the work with your own forces or obtain materials from other sources without authorization from the Department.

Replace item 6 in the list in the 4th paragraph of section 5-1.13B(2) with:

06-20-12

6. Listed DBE is ineligible to work on the project because of suspension or debarment.

Add to the list in the 4th paragraph of section 5-1.13B(2):

06-20-12

8. Listed DBE voluntarily withdraws with written notice from the Contract.
9. Listed DBE is ineligible to receive credit for the type of work required.
10. Listed DBE owner dies or becomes disabled resulting in the inability to perform the work on the Contract.
11. Department determines other documented good cause.

Add between the 4th and 5th paragraphs of section 5-1.13B(2):

07-20-12

Notify the original DBE of your intent to use other forces or material sources and provide the reasons. Provide the DBE with 5 days to respond to your notice and advise you and the Department of the reasons why the use of other forces or sources of materials should not occur. Your request to use other forces or material sources must include:

1. 1 or more of the reasons listed in the preceding paragraph
2. Notices from you to the DBE regarding the request
3. Notices from the DBE to you regarding the request

FHWA-1273 Nondiscrimination Clauses

FHWA-1273 section	FHWA-1273 clause	Department clause
Training and Promotion	In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.	If section 7-1.11D applies, section 7-1.11D supersedes this subparagraph.
Records and Reports	If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.	If the Contract requires on-the-job training, collect and report training data.

Replace the form in section 7-1.11B with:

07-20-12

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions

of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

- d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is

evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contract). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

Add to the list in the 1st paragraph of section 19-3.01A(2)(d):

01-20-12

9. Provisions for discontinuous rows of soil nails

Add to section 19-3.01A(3)(b):

01-20-12

For soil nail walls, wall zones are specified in the special provisions.

For ground anchor walls, a wall zone is the entire wall unless otherwise specified in the special provisions.

Delete the 2nd sentence in the 4th paragraph of section 19-3.01A(3)(b).

01-20-12

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

01-20-12

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

Replace the 2nd paragraph of section 19-3.03F with:

01-20-12

Do not backfill over or place material over slurry cement backfill until 4 hours after placement. When concrete sand is used as aggregate and the in-place material is free draining, you may start backfilling as soon as the surface water is gone.

Add between the 2nd and 3rd paragraphs of section 19-3.03K:

01-20-12

Before you excavate for the installation of ground anchors in a wall zone:

1. Complete stability testing
2. Obtain authorization of test data

Replace the 2nd sentence of the 7th paragraph of section 19-3.03K:

01-20-12

Stop construction in unstable areas until remedial measures have been taken. Remedial measures must be submitted and authorized.

Add between the 8th and 9th paragraphs of section 19-3.03K:

01-20-12

When your excavation and installation methods result in a discontinuous wall along any soil nail row, the ends of the structurally completed wall section must extend beyond the ends of the next lower excavation lift by a distance equal to twice the lift height. Maintain temporary slopes at the ends of each wall section to ensure slope stability.

HMA Mix Design Requirements

Quality characteristic	Test method	HMA type		
		A	B	RHMA-G
Air void content (%)	California Test 367	4.0	4.0	Section 39-1.03B
Voids in mineral aggregate (% min.)	California Test 367			
No. 4 grading		17.0	17.0	--
3/8" grading		15.0	15.0	--
1/2" grading		14.0	14.0	18.0–23.0 ^a
3/4" grading		13.0	13.0	18.0–23.0 ^a
Voids filled with asphalt (%)	California Test 367			Note c
No. 4 grading		65.0–75.0	65.0–75.0	
3/8" grading		65.0–75.0	65.0–75.0	
1/2" grading		65.0–75.0	65.0–75.0	
3/4" grading		65.0–75.0	65.0–75.0	
Dust proportion	California Test 367			Note c
No. 4 and 3/8" gradings		0.6–1.2	0.6–1.2	
1/2" and 3/4" gradings		0.6–1.2	0.6–1.2	
Stabilometer value (min.) ^b	California Test 366			
No. 4 and 3/8" gradings		30	30	--
1/2" and 3/4" gradings		37	35	23

^a Voids in mineral aggregate for RHMA-G must be within this range.

^b California Test 304, Part 2C.12.

^c Report this value in the JMF submittal.

Replace item 4 in the list in the 1st paragraph of section 39-1.03C with:

4. JMF renewal on a *Caltrans Job Mix Formula Renewal* form, if applicable

01-20-12

Replace the 2nd paragraph of section 39-1.03E with:

Use the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form. No adjustments to asphalt binder content are allowed. Based on your testing and production experience, you may submit an adjusted aggregate gradation TV on a *Contractor Job Mix Formula Proposal* form before verification testing. Aggregate gradation TV must be within the TV limits specified in the aggregate gradation tables.

04-20-12

Add between the 3rd and 4th paragraphs of section 39-1.03E:

Asphalt binder set point for HMA must be the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form. When RAP is used, asphalt binder set point for HMA must be:

04-20-12

$$\text{Asphalt Binder Set Point} = \frac{\frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)} - R_{RAP} \left[\frac{BC_{RAP}}{\left(1 - \frac{BC_{RAP}}{100}\right)} \right]}{100 + \frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)}}$$

Where:

BC_{OBC} = optimum asphalt binder content, percent based on total weight of mix

R_{RAP} = RAP ratio by weight of aggregate

BC_{RAP} = asphalt binder content of RAP, percent based on total weight of RAP mix

Replace item 4 in the list in the 8th paragraph of section 39-1.03E with:

04-20-12

4. HMA quality specified in the table titled "HMA Mix Design Requirements" except:
 - 4.1. Air void content, design value ± 2.0 percent
 - 4.2. Voids filled with asphalt, report only
 - 4.3. Dust proportion, report only

Replace the 12th paragraph of section 39-1.03E with:

04-20-12

If tests on plant-produced samples do not verify the JMF, the Engineer notifies you and you must submit a new JMF or submit an adjusted JMF based on your testing. JMF adjustments may include a change in aggregate gradation TV within the TV limits specified in the aggregate gradation tables.

Replace the 14th paragraph of section 39-1.03E with:

01-20-12

A verified JMF is valid for 12 months.

Replace the last sentence in the 15th paragraph of section 39-1.03E with:

01-20-12

This deduction does not apply to verifications initiated by the Engineer or JMF renewal.

Add between the 1st and 2nd paragraphs of section 39-1.03F:

04-20-12

Target asphalt binder content on your Contractor *Job Mix Formula Proposal* form and the OBC specified on your *Contractor Hot Mix Asphalt Design Data* form must be the same.

Delete the 4th paragraph of section 39-1.03F.

01-20-12

Replace items 3 and 5 in the list in the 6th paragraph of section 39-1.03F with:

01-20-12

3. Engineer verifies each proposed JMF renewal within 20 days of receiving verification samples.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at the Department's expense 1 proposed JMF renewal within a 12-month period.

Add between the 6th and 7th paragraphs of section 39-1.03F:

01-20-12

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or the Engineer may perform aggregate quality tests for verification of JMF renewal.

Replace section 39-1.03G with:

04-20-12

39-1.03G Job Mix Formula Modification

For an accepted JMF, you may change asphalt binder source one time during production.

Submit your modified JMF request a minimum of 3 business days before production. Each modified JMF submittal must consist of:

1. Proposed modified JMF on *Contractor Job Mix Formula Proposal* form
2. Mix design records on *Contractor Hot Mix Asphalt Design Data* form for the accepted JMF to be modified
3. JMF verification on *Hot Mix Asphalt Verification* form for the accepted JMF to be modified
4. Quality characteristics test results for the modified JMF as specified in section 39-1.03B. Perform tests at the mix design OBC as shown on the *Contractor Asphalt Mix Design Data* form
5. If required, California Test 371 test results for the modified JMF.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 5 business days of receiving all verification samples. If California Test 371 is required, the Engineer tests for California Test 371 within 10 days of receiving verification samples.

The Engineer verifies the modified JMF after the modified JMF HMA is placed on the project and verification samples are taken within the first 750 tons following sampling requirements in section 39-1.03E, "Job Mix Formula Verification." The Engineer tests verification samples for compliance with:

1. Stability as shown in the table titled "HMA Mix Design Requirements"
2. Air void content at design value ± 2.0 percent
3. Voids in mineral aggregate as shown in the table titled "HMA Mix Design Requirements"
4. Voids filled with asphalt, report only
5. Dust proportion, report only

If the modified JMF is verified, the Engineer revises your *Hot Mix Asphalt Verification* form to include the new asphalt binder source. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected.

The Engineer deducts \$2,000 from payments for each modified JMF verification. The Engineer deducts an additional \$2,000 for each modified JMF verification that requires California Test 371.

Add to section 39-1.03:

01-20-12

39-1.03H Job Mix Formula Acceptance

You may start HMA production if:

1. The Engineer's review of the JMF shows compliance with the specifications.
2. The Department has verified the JMF within 12 months before HMA production.
3. The Engineer accepts the verified JMF.

Replace "3 days" in the 1st paragraph of section 39-1.04A with:

01-20-12

3 business days

Replace the 2nd sentence in the 2nd paragraph of section 39-1.04A with:

01-20-12

During production, take samples under California Test 125. You may sample HMA from:

Replace "5 days" in the 1st paragraph of section 39-1.06 with:

01-20-12

5 business days

Replace the 3rd paragraph of section 39-1.08A with:

04-20-12

During production, you may adjust hot or cold feed proportion controls for virgin aggregate and RAP.

Add to section 39-1.08A:

04-20-12

During production, asphalt binder set point for HMA Type A, HMA Type B, HMA Type C, and RHMA-G must be the OBC shown in *Contractor Hot Mix Asphalt Design Data* form. For OGFC, asphalt binder set point must be the OBC shown on *Caltrans Hot Mix Asphalt Verification* form. If RAP is used, asphalt binder set point for HMA must be calculated as specified in section 39-1.03E.

You must request adjustments to the plant asphalt binder set point based on new RAP stockpiles average asphalt binder content. Do not adjust the HMA plant asphalt binder set point until authorized.

Replace the 3rd paragraph of section 39-1.08B with:

09-16-11

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

Replace the 15th paragraph of section 39-1.11 with:

01-20-12

For Standard and QC/QA construction processes, if 3/4-inch aggregate grading is specified, you may use a 1/2-inch aggregate grading if the specified total paved thickness is at least 0.15 foot and less than 0.20 foot thick.

Replace the 17th paragraph of section 39-1.11 with:

01-20-12

Do not open new HMA pavement to public traffic until its mid-depth temperature is below 160 degrees F.

Replace the 5th and 6th paragraphs of section 39-1.12C with:

07-20-12

On tangents and horizontal curves with a centerline radius of curvature 2,000 feet or more, the PI_0 must be at most 2.5 inches per 0.1-mile section.

On horizontal curves with a centerline radius of curvature between 1,000 feet and 2,000 feet including pavement within the superelevation transitions, the PI_0 must be at most 5 inches per 0.1-mile section.

Add to section 39-1.12:

01-20-12

39-1.12E Reserved

Add to section 39-1.14:

01-20-12

Prepare the area to receive HMA for miscellaneous areas and dikes, including any excavation and backfill as needed.

Replace "6.8" in item 3 in the list in the 4th paragraph of section 39-1.14 with:

04-20-12

6.4

Replace "6.0" in item 3 in the list in the 4th paragraph of section 39-1.14 with:

04-20-12

5.7

Replace "6.8" in the 1st paragraph of section 39-1.15B with:

04-20-12

6.4

Replace "6.0" in the 1st paragraph of section 39-1.15B with:

04-20-12

5.7

Replace the 1st paragraph of section 39-2.02B with:

04-20-12

Perform sampling and testing at the specified frequency for the quality characteristics shown in the following table:

Minimum Quality Control—Standard Construction Process

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA type			
			A	B	RHMA-G	OGFC
Aggregate gradation ^a	California Test 202	1 per 750 tons and any remaining part at the end of the project	JMF ± Tolerance ^b			
Sand equivalent (min) ^c	California Test 217		47	42	47	--
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (% max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density) ^{d,e}	QC plan	2 per business day (min.)	91–97	91–97	91–97	--
Stabilometer value (min) ^{c, f} No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	One per 4,000 tons or 2 per 5 business days, whichever is greater	30	30	--	--
			37	35	23	--
Air void content (%) ^{c, g}	California Test 367		4 ± 2	4 ± 2	TV ± 2	--
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants ^h	California Test 226 or 370	2 per day during production	--	--	--	--
Percent of crushed particles coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	As designated in the QC plan. At least once per project	90	25	--	90
			75	--	90	75
			70	20	70	90
Los Angeles Rattler (% max) Loss at 100 rev.	California Test 211		12	--	12	12

Loss at 500 rev.			45	50	40	40
Flat and elongated particles (% max by weight @ 5:1)	California Test 235		Report only	Report only	Report only	Report only
Fine aggregate angularity (% min) ⁱ	California Test 234		45	45	45	--
Voids filled with asphalt (%) ^j No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ^j No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 ^k 18.0–23.0 ^k	--
Dust proportion ^j No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367		0.6-1.2 0.6–1.2	0.6-1.2 0.6–1.2	Report only	--
Smoothness	Section 39-1.12	--	12-foot straight-edge, must grind, and PI ₀	12-foot straight-edge, must grind, and PI ₀	12-foot straight-edge, must grind, and PI ₀	12-foot straight-edge, must grind, and PI ₀
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	Section 39-1.04C	--	--	1,500–4,000	1,500–4,000
Asphalt modifier	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D

^a Determine combined aggregate gradation containing RAP under California Test 367.

^b The tolerances must comply with the allowable tolerances in section 39-1.02E.

^c Report the average of 3 tests from a single split sample.

^d Determine field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^e To determine field compaction use:

1. In-place density measurements using the method specified in your QC plan.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^f California Test 304, Part 2C.12.

^g Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

^h For adjusting the plant controller at the HMA plant.

ⁱ The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^j Report only.

^k Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 1st paragraph of section 39-2.03A with:

04-20-12

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Standard Construction Process

Quality characteristic	Test method	HMA type						
		A	B	RHMA-G	OGFC			
Aggregate gradation^a	California Test 202	JMF ± tolerance ^c						
Sieve						3/4"	1/2"	3/8"
1/2"						X ^b		
3/8"							X	
No. 4								X
No. 8						X	X	X
No. 200	X	X	X					
Sand equivalent (min) ^d	California Test 217	47	42	47	--			
Asphalt binder content (%)	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40			
HMA moisture content (% , max)	California Test 226 or 370	1.0	1.0	1.0	1.0			
Field compaction (% max. theoretical density) ^{e, f}	California Test 375	91–97	91–97	91–97	--			
Stabilometer value (min) ^{d, g}	California Test 366	30 37	30 35	-- 23	-- --			
No. 4 and 3/8" gradings								
1/2" and 3/4" gradings								
Air void content (%) ^{d, h}	California Test 367	4 ± 2	4 ± 2	TV ± 2	--			
Percent of crushed particles Coarse aggregate (% , min) One fractured face Two fractured faces Fine aggregate (% , min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	90	25	--	90			
		75	--	90	75			
		70	20	70	90			
Los Angeles Rattler (% , max) Loss at 100 rev. Loss at 500 rev.	California Test 211	12	--	12	12			
		45	50	40	40			
Fine aggregate angularity (% , min) ⁱ	California Test 234	45	45	45	--			
Flat and elongated particles (% , max by weight @ 5:1)	California Test 235	Report only	Report only	Report only	Report only			
Voids filled with asphalt (%) ^j No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	65.0–75.0	65.0–75.0	Report only	--			
		65.0–75.0	65.0–75.0					
		65.0–75.0	65.0–75.0					
		65.0–75.0	65.0–75.0					
Voids in mineral aggregate (% min) ^j No. 4 grading 3/8" grading	California Test 367	17.0	17.0	--	--			
		15.0	15.0	--	--			

1/2" grading 3/4" grading		14.0 13.0	14.0 13.0	18.0–23.0 ^k 18.0–23.0 ^k	
Dust proportion ^j No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.6-1.2 0.6–1.2	0.6-1.2 0.6–1.2	Report only	--
Smoothness	Section 39-1.12	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge, must grind, and PI ₀	12-foot straight- edge and must grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt rubber binder	Various	--	--	Section 92- 1.01D(2) and section 39-1.02D	Section 92-1.01D(2) and section 39-1.02D
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.

^b "X" denotes the sieves the Engineer tests for the specified aggregate gradation.

^c The tolerances must comply with the allowable tolerances in section 39-1.02E.

^d The Engineer reports the average of 3 tests from a single split sample.

^e The Engineer determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^f To determine field compaction, the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^g California Test 304, Part 2C.12.

^h The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

ⁱ The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^j Report only.

^k Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 5th paragraph of section 39-2.03A with:

01-20-12

The Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.2 foot and any layer is less than 0.20 foot.

Replace the 1st paragraph of section 39-3.02A with:

04-20-12

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Method Construction Process

Quality characteristic	Test method	HMA type			
		A	B	RHMA-G	OGFC
Aggregate gradation ^a	California Test 202	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b
Sand equivalent (min) ^c	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (% max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Stabilometer value (min) ^{c, d} No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30 37	30 35	-- 23	-- --
Percent of crushed particles Coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	90 75 70	25 -- 20	-- 90 70	90 75 90
Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.	California Test 211	12 45	-- 50	12 40	12 40
Air void content (%) ^{c, e}	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min)	California Test 234	45	45	45	--
Flat and elongated particles (% max by weight @ 5:1)	California Test 235	Report only	Report only	Report only	Report only
Voids filled with asphalt (%) ^g No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ^g No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 ^h 18.0–23.0 ^h	--
Dust proportion ^g No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.6-1.2 0.6–1.2	0.6-1.2 0.6–1.2	Report only	--
Smoothness	Section 39-1.12	12-foot straight-edge and	12-foot straight-edge and	12-foot straight-edge and	12-foot straight-edge and

		must-grind	must-grind	must-grind	must-grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt rubber binder	Various	--	--	Section 92-1.01D(2) and section 39-1.02D	Section 92-1.01D(2) and section 39-1.02D
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.

^b The tolerances must comply with the allowable tolerances in section 39-1.02E.

^c The Engineer reports the average of 3 tests from a single split sample.

^d California Test 304, Part 2C.12.

^e The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

^f The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^g Report only.

^h Voids in mineral aggregate for RHMA-G must be within this range.

Replace "280 degrees F" in item 2 in the list in the 6th paragraph of section 39-3.04 with:

285 degrees F

01-20-12

Replace the 8th paragraph of section 39-4.02C with:

Comply with the values for the HMA quality characteristics and minimum random sampling and testing for quality control shown in the following table:

04-20-12

Minimum Quality Control—QC/QA Construction Process

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA Type			Location of sampling	Maximum report-ing time allow-ance
			A	B	RHMA-G		
Aggregate gradation ^a	California Test 202	1 per 750 tons	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b	California Test 125	24 hours
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ±0.40	Loose mix behind paver See California Test 125	
Field compaction (% max. theoretical density) ^{c,d}	QC plan		92–96	92–96	91–96	QC plan	
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants ^e	California Test 226 or 370	2 per day during production	--	--	--	Stock-piles or cold feed belts	--
Sand equivalent (min) ^f	California Test 217	1 per 750 tons	47	42	47	California Test 125	24 hours
HMA moisture content (% max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	Loose Mix Behind Paver See California Test 125	24 hours
Stabilometer value (min) ^{f,g}	California Test 366	1 per 4,000 tons or 2 per 5 business days, whichever is greater	30	30	--		48 hours
No. 4 and 3/8" gradings 1/2" and 3/4" gradings			37	35	23		
Air void content (%) ^{f,h}	California Test 367		4 ± 2	4 ± 2	TV ± 2		

Percent of crushed particles coarse aggregate (% min.): One fractured face Two fractured faces	California Test 205		90	25	--	California Test 125	48 hours
Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.): One fractured face			75	--	90		
Los Angeles Rattler (% max): Loss at 100 rev. Loss at 500 rev.	California Test 211	As designated in QC plan.	12	--	12	California Test 125	
Fine aggregate angularity (% min) ⁱ	California Test 234		45	50	40		
Flat and elongated particle (% max by weight @ 5:1)	California Test 235	At least once per project.	45	45	45	California Test 125	
Voids filled with asphalt (%) ⁱ : No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		Report only	Report only	Report only	California Test 125	
Voids in mineral aggregate (% min.) ^j : No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367		65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only		
			17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0– 23.0 ^k 18.0– 23.0 ^k		

Dust proportion ^j :	California Test 367						
No. 4 and 3/8" gradings			0.6-1.2	0.6-1.2	Report only		
1/2" and 3/4" gradings			0.6-1.2	0.6-1.2			
Smoothness	Section 39-1.12	--	12-foot straight-edge, must-grind, and PI ₀	12-foot straight-edge, must-grind, and PI ₀	12-foot straight-edge, must-grind, and PI ₀	--	
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	--	--	--	1,500-4,000	Section 39-1.02D	24 hours
CRM	Section 39-1.02D	--	--	--	Section 39-1.02D	Section 39-1.02D	48 hours

^a Determine combined aggregate gradation containing RAP under California Test 367.

^b The tolerances must comply with the allowable tolerances in section 39-1.02E.

^c Determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^d To determine field compaction use:

1. In-place density measurements using the method specified in your QC plan.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^e For adjusting the plant controller at the HMA plant.

^f Report the average of 3 tests from a single split sample.

^g California Test 304, Part 2C, 12.

^h Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

ⁱ The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^j Report only.

^k Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 1st sentence in the 1st paragraph of section 39-4.03B(2) with:

01-20-12

For aggregate gradation and asphalt binder content, the minimum ratio of verification testing frequency to quality control testing frequency is 1:5.

Replace the 2nd "and" in the 7th paragraph of section 39-4.03B(2) with:

01-20-12

or

Replace the 1st paragraph of section 39-4.04A with:

04-20-12

The Engineer samples for acceptance testing and tests for the following quality characteristics:

HMA Acceptance—QC/QA Construction Process

Index (i)	Quality characteristic				Weighting factor (w)	Test method	HMA type		
							A	B	RHMA-G
		Aggregate gradation ^a				California Test 202	JMF ± Tolerance ^c		
	Sieve	3/4"	1/2"	3/8"					
1	1/2"	X ^b	--	--	0.05				
1	3/8"	--	X	--	0.05				
1	No. 4	--	--	X	0.05				
2	No. 8	X	X	X	0.10				
3	No. 200	X	X	X	0.15				
4	Asphalt binder content (%)				0.30	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40
5	Field compaction (% max. theoretical density) ^{d, e}				0.40	California Test 375	92–96	92–96	91–96
	Sand equivalent (min) ^f					California Test 217	47	42	47
	Stabilometer value (min) ^{f, g} No. 4 and 3/8" gradings 1/2" and 3/4" gradings					California Test 366	30 37	30 35	-- 23
	Air void content (%) ^{f, h}					California Test 367	4 ± 2	4 ± 2	TV ± 2
	Percent of crushed particles coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on No. 8 sieve.) One fractured face					California Test 205	90 75 70	25 -- 20	-- 90 70
	HMA moisture content (% max)					California Test 226 or 370	1.0	1.0	1.0
	Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.					California Test 211	12 45	-- 50	12 40
	Fine aggregate angularity (% min) ⁱ					California Test 234	45	45	45
	Flat and elongated particle (% max by weight @ 5:1)					California Test 235	Report only	Report only	Report only
	Voids in mineral aggregate (% min) ^j No. 4 grading 3/8" grading 1/2" grading 3/4" grading					California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 18.0–23.0

	Voids filled with asphalt (%) ^j No. 4 grading 3/8" grading 1/2" grading 3/4" grading		California Test 367	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only
	Dust proportion ^l No. 4 and 3/8" gradings 1/2" and 3/4" gradings		California Test 367	0.6–1.2 0.6–1.2	0.6–1.2 0.6–1.2	Report only
	Smoothness		Section 39-1.12	12-foot straight-edge, must grind, and P ₁₀	12-foot straight-edge, must grind, and P ₁₀	12-foot straight-edge, must grind, and P ₁₀
	Asphalt binder		Various	Section 92	Section 92	Section 92
	Asphalt rubber binder		Various	--	--	Section 92-1.01D(2) and section 39-1.02D
	Asphalt modifier		Various	--	--	Section 39-1.02D
	CRM		Various	--	--	Section 39-1.02D

^a The Engineer determines combined aggregate gradations containing RAP under California Test 367.

^b "X" denotes the sieves the Engineer tests for the specified aggregate gradation.

^c The tolerances must comply with the allowable tolerances in section 39-1.02E.

^d The Engineer determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and less than 0.20 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

^e To determine field compaction, the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

^f The Engineer reports the average of 3 tests from a single split sample.

^g California Test 304, Part 2C.12.

^h The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.

ⁱ The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

^j Report only.

^k Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 3rd paragraph of section 39-4.04A with:

01-20-12

The Department determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 and any layer is less than 0.20 foot.

AA

40 CONCRETE PAVEMENT

01-20-12

Replace section 40-1.01C(4) with:

01-20-12

40-1.01C(4) Authorized Laboratory

Submit for authorization the name of the laboratory you propose to use for testing the drilled core specimens for air content.

Replace the paragraph in section 40-1.01C(8) with:

01-20-12

Submit a plan for protecting concrete pavement during the initial 72 hours after paving when the forecasted minimum ambient temperature is below 40 degrees F.

Delete "determined under California Test 559" in section 40-1.01C(9).

01-20-12

Replace the 2nd and 3rd paragraphs in section 40-1.01D(4) with:

01-20-12

The QC plan must include details of corrective action to be taken if any process is out of control. As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
 - 2.1. One point falls outside the suspension limit line
 - 2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent material.

Replace the 1st paragraph in section 40-1.01D(5) with:

01-20-12

Determine the minimum cementitious materials content. Use your value for minimum cementitious material content for *MC* in equation 1 and equation 2 of section 90-1.02B(3).

Replace the 1st sentence of the 3rd paragraph of section 40-1.01D(9) with:

01-20-12

Use a California profilograph to determine the concrete pavement profile.

Replace the title of the table in section 40-1.01D(13)(a) with:

01-20-12

Concrete Pavement Acceptance Testing

Replace the 2nd and 3rd paragraphs in section 40-1.01D(13)(a) with:

01-20-12

Pavement smoothness may be accepted based on the Department's testing. A single test represents no more than 0.1 mile.

Acceptance of modulus of rupture, thickness, dowel bar and tie bar placement, coefficient of friction, smoothness, and air content, does not constitute final concrete pavement acceptance.

Delete item 4 in the list in the 2nd paragraph in section 40-1.01D(13)(c)(2).

01-20-12

Replace items 1 and 2 in the list in the 2nd paragraph in 40-1.01D(13)(d) with:

01-20-12

1. For tangents and horizontal curves having a centerline radius of curvature 2,000 feet or more, the PI_0 must be at most 2-1/2 inches per 0.1-mile section.
2. For horizontal curves having a centerline radius of curvature from 1,000 to 2,000 feet including concrete pavement within the superelevation transitions of those curves, the PI_0 must be at most 5 inches per 0.1-mile section.

Replace the 1st and 2nd variables in the equation in section 40-1.01D(13)(f) with:

01-20-12

n_c = Number of your quality control tests (minimum of 6 required)
 n_v = Number of verification tests (minimum of 2 required)

Replace "Your approved third party independent testing laboratory" in the 4th paragraph of section 40-1.01D(13)(f) with:

01-20-12

The authorized laboratory

Replace item 2 in the list in the 2nd paragraph of section 40-1.01D(13)(g):

01-20-12

2. One test for every 4,000 square yards of concrete pavement with tie bars or remaining fraction of that area. Each tie bar test consists of 2 cores with 1 on each tie-bar-end to expose both ends and allow measurement.

Replace section 40-1.01D(13)(h) with:

01-20-12

40-1.01D(13)(h) Bar Reinforcement

Bar reinforcement is accepted based on inspection before concrete placement.

Replace the paragraph in section 40-1.02B(2) with:

01-20-12

PCC for concrete pavement must comply with section 90-1 except as otherwise specified.

Replace the paragraphs in section 40-1.02D with:

01-20-12

Bar reinforcement must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, bar reinforcement must comply with section 52.

If the project is shown to be in high desert or any mountain climate regions, bar reinforcement must be one of the following:

1. Epoxy-coated bar reinforcement under section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Low carbon, chromium steel bar complying with ASTM A 1035/A 1035M

Replace the paragraphs in section 40-1.02E with:

01-20-12

Tie bars must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with either section 52-2.02B or 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02C, or section 52-2.03C.

Do not bend tie bars.

Replace the 1st, 2nd, and 3rd paragraphs in section 40-1.02F with:

01-20-12

Dowel bars must be plain bars. Fabricate, sample, and handle epoxy-coated dowel bars under ASTM D 3963/D 3963M and section 52-2.03C except each sample must be 18 inches long.

If the project is not shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with either section 52-2.02B or 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with section 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Replace the paragraphs in section 40-1.02G with:

01-20-12

For dowel and tie bar baskets, wire must comply with ASTM A 82/A 82M and be welded under ASTM A 185/A 185M, Section 7.4. The minimum wire-size no. is W10. Use either U-frame or A-frame shaped assemblies.

If the project is not shown to be in high desert or any mountain climate region. Baskets may be epoxy-coated, and the epoxy coating must comply with either section 52-2.02B or 52-2.03B.

If the project is shown to be in high desert or any mountain climate region, wire for dowel bar and tie bar baskets must be one of the following:

1. Epoxy-coated wire complying with section 52-2.03B
2. Stainless-steel wire. Wire must be descaled, pickled, and polished solid stainless-steel. Wire must comply with (1) the chemical requirements in ASTM A 276/A 276M, UNS Designation S31603 or S31803 and (2) the tension requirements in ASTM A 1022/ A 1022M.

Handle epoxy-coated tie bar and dowel bar baskets under ASTM D 3963/D 3963M and either section 52-2.02B or 52-2.03B.

Fasteners must be driven fasteners under ASTM F 1667. Fasteners on lean concrete base or HMA must have a minimum shank diameter of 3/16 inch and a minimum shank length of 2-1/2 inches. For asphalt treated permeable base or cement treated permeable base, the shank diameter must be at least 3/16 inch and the shank length must be at least 5 inches.

Fasteners, clips, and washers must have a minimum 0.2-mil thick zinc coating applied by either electroplating or galvanizing.

Replace the 1st paragraph in section 40-1.02H with:

01-20-12

Chemical adhesive for drilling and bonding dowels and tie bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for the concrete temperature and installation conditions.

Replace section 40-1.02I(2) with:

01-20-12

40-1.02I(2) Silicone Joint Sealant

Silicone joint sealant must be on the Authorized Material List.

Replace the last sentence in section 40-1.02I(4) with:

01-20-12

Show evidence that the seals are compressed from 30 to 50 percent for the joint width at time of installation.

Replace the paragraph in section 40-1.02L with:

01-20-12

Water for core drilling may be obtained from a potable water source, or submit proof that it does not contain:

1. More than 1,000 parts per million of chlorides as Cl
2. More than 1,300 parts per million of sulfates as SO₄
3. Impurities that cause pavement discoloration or surface etching

Replace the paragraph in section 40-1.03B with:

01-20-12

Before placing concrete pavement, develop enough water supply for the work under section 17.

Replace the last paragraph in section 40-1.03D(1) with:

01-20-12

Removal of grinding residue must comply with section 42-1.03B.

Replace the 1st and 2nd paragraphs in section 40-1.03E(6)(c) with:

01-20-12

Install preformed compressions seals in isolation joints if specified in the special provisions.

Install longitudinal seals before transverse seals. Longitudinal seals must be continuous except splicing is allowed at intersections with transverse seals. Transverse seals must be continuous for the entire transverse length of concrete pavement except splices are allowed for widenings and staged construction. With a sharp instrument, cut across the longitudinal seal at the intersection with transverse construction joints. If the longitudinal seal does not relax enough to properly install the transverse seal, trim the longitudinal seal to form a tight seal between the 2 joints.

If splicing is authorized, splicing must comply with the manufacturer's written instructions.

Replace the last 2 paragraphs in section 40-1.03G with:

01-20-12

Construct additional test strips if you:

1. Propose different paving equipment including:
 - 1.1. Paver
 - 1.2. Dowel bar inserter
 - 1.3. Tie bar inserter
 - 1.4. Tining
 - 1.5. Curing equipment
2. Change concrete mix proportions

You may request authorization to eliminate the test strip if you use paving equipment and personnel from a Department project (1) for the same type of pavement and (2) completed within the past 12 months. Submit supporting documents and previous project information with your request.

Replace the 1st paragraph in section 40-1.03I with:

01-20-12

Place tie bars in compliance with the tolerances shown in the following table:

Tie Bar Tolerance

Dimension	Tolerance
Horizontal and vertical skew	10 degrees maximum
Longitudinal translation	± 2 inch maximum
Horizontal offset (embedment)	± 2 inch maximum
Vertical depth	1. Not less than 1/2 inch below the saw cut depth of joints 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom

Replace item 4 in the list in the 2nd paragraph in section 40-1.03I with:

01-20-12

4. Use tie bar baskets. Anchor baskets at least 200 feet in advance of pavement placement activity. If you request a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before paving, demonstrate the tie bars do not move from their specified depth and alignment during paving. Use fasteners to anchor tie bar baskets.

Replace "The maximum distance below the depth shown must be 0.05 foot." in the table in section 40-1.03J with:

01-20-12

The maximum distance below the depth shown must be 5/8 inch.

Replace sections 40-1.03L and 40-1.03M with:

01-20-12

40-1.03L Finishing

40-1.03L(1) General

Reserved

40-1.03L(2) Preliminary Finishing

40-1.03L(2)(a) General

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day's paving with a stamp. The stamp must be authorized before paving starts. The stamp must be approximately 1 by 2 feet in size. The stamp must form a uniform mark from 1/8 to 1/4 inch deep. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the pavement's outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement's outside edge.

Do not apply more water to the pavement surface than can evaporate before float finishing and texturing are completed.

40-1.03L(2)(b) Stationary Side Form Finishing

If stationary side form construction is used, give the pavement a preliminary finish by the machine float method or the hand method.

If using the machine float method:

1. Use self-propelled machine floats.

2. Determine the number of machine floats required to perform the work at a rate equal to the pavement delivery rate. If the time from paving to machine float finishing exceeds 30 minutes, stop pavement delivery. When machine floats are in proper position, you may resume pavement delivery and paving.
3. Run machine floats on side forms or adjacent pavement lanes. If running on adjacent pavement, protect the adjacent pavement surface under section 40-1.03P. Floats must be hardwood, steel, or steel-shod wood. Floats must be equipped with devices that adjust the underside to a true flat surface.

If using the hand method, finish pavement smooth and true to grade with manually operated floats or powered finishing machines.

40-1.03L(2)(c) Slip-Form Finishing

If slip-form construction is used, the slip-form paver must give the pavement a preliminary finish. You may supplement the slip-form paver with machine floats.

Before the pavement hardens, correct pavement edge slump in excess of 0.02 foot exclusive of edge rounding.

40-1.03L(3) Final Finishing

After completing preliminary finishing, round the edges of the initial paving widths to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Construct longitudinal grooves with a self-propelled machine designed specifically for grooving and texturing pavement. The machine must have tracks to maintain constant speed, provide traction, and maintain accurate tracking along the pavement surface. The machine must have a single row of rectangular spring steel tines. The tines must be from 3/32 to 1/8 inch wide, on 3/4-inch centers, and must have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep. The machine must have horizontal and vertical controls. The machine must apply constant down pressure on the pavement surface during texturing. The machines must not cause ravels.

Construct grooves over the entire pavement width in a single pass except do not construct grooves 3 inches from the pavement edges and longitudinal joints. Final texture must be uniform and smooth. Use a guide to properly align the grooves. Grooves must be parallel and aligned to the pavement edge across the pavement width. Grooves must be from 1/8 to 3/16 inch deep after the pavement has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand-construct grooves under section 40-1.03L(2) using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Initial and final texturing must produce a coefficient of friction of at least 0.30 when tested under California Test 342. Notify the Engineer when the pavement is scheduled to be opened to traffic to allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is ready for testing which is the latter of:

1. Seven days after paving
2. When the pavement has attained a modulus of rupture of 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

40-1.03M Reserved

Replace "Reserved" in section 49-3.02A(3)(a) with:

01-20-12

If plastic spacers are proposed for use, submit the manufacturer's data and a sample of the plastic spacer. Allow 10 days for review.

Replace item 2 in the list in the 1st paragraph of section 49-3.02A(3)(g) with:

01-20-12

2. Be sealed and signed by an engineer who is registered as a civil engineer in the State. This requirement is waived for either of the following conditions:
 - 2.1. The proposed mitigation will be performed under the current Department-published version of *ADSC Standard Mitigation Plan 'A' - Basic Repair* without exception or modification.
 - 2.2. The Engineer determines that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and you elect to repair the pile using the current Department-published version of *ADSC Standard Mitigation Plan 'B' - Grouting Repair* without exception or modification.

Replace item 1 in the list in the 1st paragraph of section 49-3.02A(4)(d)(ii) with:

01-20-12

1. Inspection pipes must be schedule 40 PVC pipe complying with ASTM D 1785 with a nominal pipe size of 2 inches. Watertight PVC couplers complying with ASTM D 2466 are allowed to facilitate pipe lengths in excess of those commercially available. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.

Add to section 49-3.02A(4)(d)(iv):

01-20-12

If the Engineer determines it is not feasible to use one of ADSC's standard mitigation plans to mitigate the pile, schedule a meeting and meet with the Engineer before submitting a nonstandard mitigation plan.

The meeting attendees must include your representatives and the Engineer's representatives involved in the pile mitigation. The purpose of the meeting is to discuss the type of pile mitigation acceptable to the Department.

Provide the meeting facility. The Engineer conducts the meeting.

Replace the 1st paragraph of section 49-3.02B(5) with:

01-20-12

Grout used to backfill casings must comply with section 50-1.02C, except:

1. Grout must consist of cementitious material and water, and may contain an admixture if authorized. Cementitious material must comply with section 90-1.02B, except SCMs are not required. The minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.
2. Aggregate must be used to extend the grout as follows:
 - 2.1. Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
 - 2.2. Fine aggregate must comply with section 90-1.02C(3).
 - 2.3. Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 90 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
3. California Test 541 is not required.
4. Grout is not required to pass through a sieve with a 0.07-inch maximum clear opening before being introduced into the grout pump.

Before grinding and grooving, deck surfaces must comply with the smoothness and deck crack treatment requirements.

Grind and groove the deck surface as follows:

1. Grind the surface to within 18 inches of the toe of the barrier under section 42-3. Grinding must not reduce the concrete cover on reinforcing steel to less than 1-3/4 inches.
2. Groove the ground surfaces longitudinally under section 42-2. The grooves must be parallel to the centerline.

51-1.03F(5)(b)(iii) Longitudinal Tining

When texturing the deck surface by longitudinal tining, perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with spring steel tines that produce grooves parallel with the centerline.

The tines must:

1. Be rectangular in cross section
2. Be from 3/32 to 1/8 inch wide on 3/4-inch centers
3. Have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep

Construct grooves to within 6 inches of the layout line of the concrete barrier toe. Grooves must be from 1/8 to 3/16 inch deep and 3/16 inch wide after concrete has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand construct grooves. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Tining must not cause tearing of the deck surface or visible separation of coarse aggregate at the surface.

Replace the 2nd and 3rd paragraphs of section 51-2.02B(3)(b) with:

04-20-12

Concrete saws for cutting grooves in the concrete must have diamond blades with a minimum thickness of 3/16 inch. Cut both sides of the groove simultaneously for a minimum 1st pass depth of 2 inches. The completed groove must have:

1. Top width within 1/8 inch of the width shown or ordered
2. Bottom width not varying from the top width by more than 1/16 inch for each 2 inches of depth
3. Uniform width and depth

Cutting grooves in existing decks includes cutting any conflicting reinforcing steel.

Replace the 2nd paragraph of section 51-2.02E(1)(e) with:

08-05-11

Except for components in contact with the tires, the design loading must be the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. Each component in contact with the tires must support a minimum of 80 percent of the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. The tire contact area must be 10 inches measured normal to the longitudinal assembly axis by 20 inches wide. The assembly must provide a smooth-riding joint without slapping of components or tire rumble.

04-20-12

Delete the 2nd paragraph of section 51-4.01A.

Replace the table in the 1st paragraph of section 88-1.02G with:

01-20-12

Sediment Filter Bag

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	250
Apparent elongation, percent min, in each direction	ASTM D 4632	10	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	100-200	75-200
Permittivity, sec ⁻¹ min	ASTM D 4491	1.0	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace the table in the 1st paragraph of section 88-1.02H with:

01-20-12

Temporary Cover

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	200
Apparent elongation, percent min, in each direction	ASTM D 4632	15	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	4-10	80-120
Permittivity, sec ⁻¹ min	ASTM D 4491	0.05	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

DIVISION X MATERIALS

90 CONCRETE

08-05-11

Replace the 3rd paragraph of section 90-1.01C(7) with:

08-05-11

Submit weighmaster certificates in printed form or, if authorized, in electronic media. Present electronic media in a tab-delimited format on a CD or DVD. Captured data for the ingredients represented by each batch must be line feed carriage return and one line separate record with sufficient fields for the specified data.

