



STATE OF CALIFORNIA  
DEPARTMENT OF TRANSPORTATION

**NOTICE TO BIDDERS  
AND  
SPECIAL PROVISIONS**

**FOR CONSTRUCTION ON STATE HIGHWAY IN CONTRA COSTA COUNTY IN  
AND NEAR MARTINEZ FROM ARTHUR ROAD UNDERCROSSING TO 0.5 MILE  
NORTH OF MOCOCO OVERHEAD**

**In District 04 On Route 680**

**Under**

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*Bid book dated October 21, 2013*

*Standard Specifications dated 2010*

*Project plans approved May 20, 2013*

*Standard Plans dated 2010*

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Identified by

Contract No. 04-3A8704

04-CC-680-22.7/24.8

Project ID 0400000967

Federal-Aid Project

ACNHPI-680-1(071)E

REPLACED PER ADDENDUM NO. 2 DATED JANUARY 31, 2014

XS

Bids open Wednesday, February 19, 2014  
Dated October 21, 2013

OSD  
IH

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# SPECIAL NOTICES

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- For federal-aid projects, the Department is modifying its DBE program.

# CONTRACT NO. 04-3A8704

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

## HIGHWAYS

  
REGISTERED CIVIL ENGINEER

9-19-13

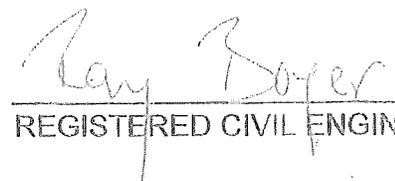


## LANDSCAPE & EROSION CONTROL

  
LICENSED LANDSCAPE ARCHITECT

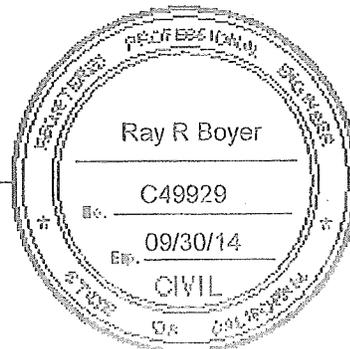


## Hazardous Waste

  
REGISTERED CIVIL ENGINEER

4-18-2013

DATE



# CONTRACT NO. 04-3A8704

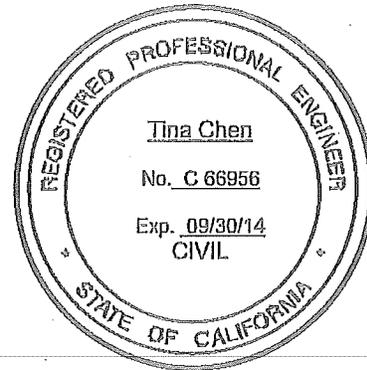
The special provisions contained herein have been prepared by or under the direction of the following Registered Person.

## STRUCTURES



4/18/13

REGISTERED CIVIL ENGINEER

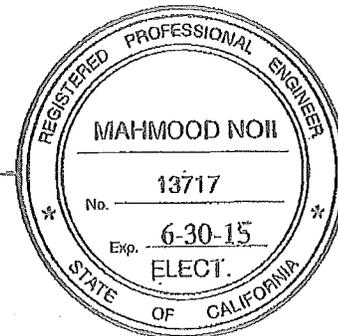


## ELECTRICAL



Sep, 19, 2013

REGISTERED ELECTRICAL ENGINEER



## WATER POLLUTION CONTROL



9/19/13

REGISTERED CIVIL ENGINEER



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# STANDARD PLANS LIST

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.

A10A	Abbreviations (Sheet 1 of 2)
RSP A10B	Abbreviations (Sheet 2 of 2)
A10C	Lines and Symbols (Sheet 1 of 3)
A10D	Lines and Symbols (Sheet 2 of 3)
A10E	Lines and Symbols (Sheet 3 of 3)
A10F	Legend - Soil (Sheet 1 of 2)
A10G	Legend - Soil (Sheet 2 of 2)
A20A	Pavement Markers and Traffic Lines, Typical Details
A20B	Pavement Markers and Traffic Lines, Typical Details
RSP A20C	Pavement Markers and Traffic Lines, Typical Details
A20D	Pavement Markers and Traffic Lines, Typical Details
RSP A24A	Pavement Markings - Arrows
A24B	Pavement Markings - Arrows and Symbols
A24D	Pavement Markings - Words
RSP A24E	Pavement Markings - Words, Limit and Yield Lines
A62A	Excavation and Backfill - Miscellaneous Details
A63A	Portable Concrete Barrier (Type 60K)
A73A	Object Markers
A73B	Markers
A73C	Delineators, Channelizers and Barricades
A76A	Concrete Barrier Type 60
RSP A77L1	Midwest Guardrail System Standard Railing Section (Wood Post with Wood Block)
RSP A77M1	Midwest Guardrail System Standard Hardware
RSP A77N1	Midwest Guardrail System Wood Post and Wood Block Details
RSP A77N3	Midwest Guardrail System Typical Line Post Embedment and Hinge Point Offset Details
RSP A77N4	Midwest Guardrail System Typical Railing Delineation and Dike Positioning Details
RSP A77N5	Midwest Guardrail System Typical Vegetation Control Standard Railing Section
RSP A77N6	Midwest Guardrail System Typical Vegetation Control for Terminal System End Treatments
RSP A77Q1	Midwest Guardrail System Typical Layouts for Structure Approach
RSP A77Q2	Midwest Guardrail System Typical Layouts for Structure Approach and Between

	Structures
RSP A77U1	Midwest Guardrail System Connections to Bridge Railings without Sidewalks Details No. 1
RSP A77U3	Midwest Guardrail System Connections to Abutments and Walls
RSP A77U4	Midwest Guardrail System Transition Railing (Type WB-31)
A85	Chain Link Fence
A85A	Chain Link Fence Details
RSP A85B	Chain Link Fence Details
RSP A87B	Hot Mix Asphalt Dikes
D87D	Overside Drains
RSP H1	Landscape and Erosion Control Abbreviations
H51	Erosion Control Details - Fiber Roll and Compost Sock
H52	Rolled Erosion Control Product
T1A	Temporary Crash Cushion, Sand Filled (Unidirectional)
T1B	Temporary Crash Cushion, Sand Filled (Bidirectional)
T2	Temporary Crash Cushion, Sand Filled (Shoulder Installations)
T3A	Temporary Railing (Type K)
T3B	Temporary Railing (Type K)
RSP T9	Traffic Control System Tables for Lane and Ramp Closures
RSP T10	Traffic Control System for Lane Closure on Freeways and Expressways
RSP T11	Traffic Control System for Lane Closure on Multilane Conventional Highways
RSP T13	Traffic Control System for Lane Closure on Two Lane Conventional Highways
RSP T14	Traffic Control System for Ramp Closure
RSP T15	Traffic Control System for Moving Lane Closure on Multilane Highways
RSP T16	Traffic Control System for Moving Lane Closure on Multilane Highways
RSP T17	Traffic Control System for Moving Lane Closure on Two Lane Highways
T53	Temporary Water Pollution Control Details (Temporary Cover)
T55	Temporary Water Pollution Control Details (Temporary Erosion Control Blanket)
T56	Temporary Water Pollution Control Details (Temporary Fiber Roll)
T58	Temporary Water Pollution Control Details (Temporary Construction Entrance)
T59	Temporary Water Pollution Control Details (Temporary Concrete Washout Facility)
T60	Temporary Water Pollution Control Details (Temporary Reinforced Silt Fence)
T61	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T62	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T63	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)
T64	Temporary Water Pollution Control Details (Temporary Drainage Inlet Protection)

T67	Temporary Water Pollution Control Details (Temporary Construction Roadway)
B0-1	Bridge Details
B0-3	Bridge Details
B0-5	Bridge Details
RSP B3-1A	Retaining Wall Type 1 (Case 1)
RSP B3-5	Retaining Wall Details No. 1
B3-6	Retaining Wall Details No. 2
B6-21	Joint Seals (Maximum Movement Rating = 2")
B7-1	Box Girder Details
B7-6	Deck Drains - Types D-1 and D-2
B7-8	Deck Drainage Details
RSP B11-57	Concrete Barrier Type 742
RS1	Roadside Signs, Typical Installation Details No. 1
RS2	Roadside Signs - Wood Post, Typical Installation Details No. 2
RS4	Roadside Signs, Typical Installation Details No. 4
S95	Roadside Single Sheet Aluminum Signs, Diamond Shape
RSP ES-1A	Electrical Systems (Legend and Abbreviations)
RSP ES-1B	Electrical Systems (Legend and Abbreviations)
RSP ES-1C	Electrical Systems (Legend and Abbreviations)
ES-2C	Electrical Systems (Service Equipment Notes, Type III Series)
ES-2D	Electrical Systems (Service Equipment Enclosure and Typical Wiring Diagram, Type III - A Series)
ES-3C	Electrical Systems (Controller Cabinet Foundation Details)
RSP ES-4A	Electrical Systems (Vehicular Signal Heads and Mountings)
RSP ES-4C	Electrical Systems (Vehicular Signal Heads and Mountings)
ES-4D	Electrical Systems (Signal Mounting)
RSP ES-4E	Electrical Systems (Vehicular Signal Heads and Optical Detector Mounting)
ES-5A	Electrical Systems (Detectors)
RSP ES-5B	Electrical Systems (Detectors)
RSP ES-5D	Electrical Systems (Curb Termination and Handhole)
ES-7B	Electrical Systems (Signal and Lighting Standard - Type 1 and Equipment Numbering)
RSP ES-7D	Electrical Systems (Signal and Lighting Standard, Case 2 Signal Mast Arm Loading, Wind Velocity = 100 mph and Signal Mast Arm Lengths 15' to 30')
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)

RSP ES-8A	Electrical Systems (Non-Traffic Pull Box)
RSP ES-10A	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)

## CANCELED STANDARD PLANS LIST

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

Plan No.	Date Canceled	Plan No.	Date Canceled	Plan No.	Date Canceled
A77A1	07-19-13	A77J4	07-19-13	ES-6J	07-19-13
A77A2	07-19-13	A77K1	07-19-13	ES-7I	07-19-13
A77B1	07-19-13	A77K2	07-19-13	ES-8	01-20-12
A77C1	07-19-13	P3	07-19-13	ES-10	07-20-12
A77C2	07-19-13	C8A	07-19-13		
A77C3	07-19-13	C8B	07-19-13		
A77C4	07-19-13	C8C	07-19-13		
RSP A77C5	07-19-13	B3-1	04-20-12		
RSP A77C6	07-19-13	B3-2	04-20-12		
RSP A77C7	07-19-13	B3-3	04-20-12		
RSP A77C8	07-19-13	B3-4	04-20-12		
RSP A77C9	07-19-13	B3-7	04-20-12		
RSP A77C10	07-19-13	B3-8	04-20-12		
A77E1	07-19-13	S7	07-19-13		
A77E2	07-19-13	S14	07-19-13		
A77E3	07-19-13	S41	07-19-13		
A77E4	07-19-13	S42	07-19-13		
A77E5	07-19-13	S43	07-19-13		
A77E6	07-19-13	S44	07-19-13		
A77F1	07-19-13	S45	07-19-13		
A77F2	07-19-13	S46	07-19-13		
A77F3	07-19-13	S47	07-19-13		
A77F4	07-19-13	S120	07-19-13		
A77F5	07-19-13	S121	07-19-13		
A77G1	07-19-13	S122	07-19-13		
A77G2	07-19-13	S123	07-19-13		
A77G3	07-19-13	S124	07-19-13		
A77G4	07-19-13	S125	07-19-13		
A77G5	07-19-13	S126	07-19-13		
A77G6	07-19-13	S127	07-19-13		
A77G7	07-19-13	S128	07-19-13		
A77G8	07-19-13	S129	07-19-13		
A77H1	07-19-13	S130	07-19-13		
A77H2	07-19-13	S131	07-19-13		
A77H3	07-19-13	S132	07-19-13		
A77I1	07-19-13	S133	07-19-13		
A77I2	07-19-13	S134	07-19-13		
A77J1	07-19-13	S135	07-19-13		
A77J2	07-19-13	ES-6H	07-19-13		
A77J3	07-19-13	ES-6I	07-19-13		

# NOTICE TO BIDDERS

Bids open Wednesday, February 19, 2014

Dated October 21, 2013

General work description: Retrofit bridge, replace bridge, and construct emergency access lane.

The Department will receive sealed bids for CONSTRUCTION ON STATE HIGHWAY IN CONTRA COSTA COUNTY IN AND NEAR MARTINEZ FROM ARTHUR ROAD UNDERCROSSING TO 0.5 MILE NORTH OF MOCOCO OVERHEAD.

District-County-Route-Post Mile: 04-CC-680-22.7/24.8

Contract No. 04-3A8704

The Contractor must have either a Class A license or any combination of the following Class C licenses which constitutes a majority of the work: C-8, C-51.

The DBE Contract goal is 7 percent.

Federal-aid project no.:

ACNHPI-680-1(071)E

Bids must be on a unit price basis.

Complete the work, excluding plant establishment work, within 315 working days.

Complete the work, including plant establishment work, within 565 working days.

Complete the plant establishment work within 250 working days.

The estimated cost of the project is \$13,900,000.

Optional prebid meeting is scheduled for February 10, 2014, at 10:00 a.m. at 2727 Systrom Drive #150, Concord, CA 94518.

The Department will receive bids until 2:00 p.m. on the bid open date at 1727 30th Street, Bidders' Exchange, MS 26, Sacramento, CA 95816. Bids received after this time will not be accepted. Department staff will direct the bidders to the bid opening.

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/inquiry/bid\\_inquiries.php](http://www.dot.ca.gov/hq/esc/oe/inquiry/bid_inquiries.php)

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.

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 federal minimum wage rates for this Contract as determined by the United States Secretary of Labor are available at <http://www.dot.ca.gov/hq/esc/oe/federal-wages>.

If the minimum wage rates as determined by the United States Secretary of Labor differs from the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors must not pay less than the higher wage rate. The Department does not accept lower State wage rates not specifically included in the federal minimum wage determinations. This includes helper, or other classifications based on hours of experience, or any other classification not appearing in the federal wage determinations. Where federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors must not pay less than the federal minimum wage rate that most closely approximates the duties of the employees in question.

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](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

EHT

**BID ITEM LIST**

<b>Item No.</b>	<b>Item Code</b>	<b>Item Description</b>	<b>Unit of Measure</b>	<b>Estimated Quantity</b>
1	070030	LEAD COMPLIANCE PLAN	LS	LUMP SUM
2	080050	PROGRESS SCHEDULE (CRITICAL PATH METHOD)	LS	LUMP SUM
3	090100	TIME-RELATED OVERHEAD (WDAY)	WDAY	315
4	026042	TEMPORARY CONSTRUCTION ACCESS	LS	LUMP SUM
5	026043	TEMPORARY TIMBER CONSTRUCTION MAT	SQFT	110,000
6	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
7	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM
8	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	770
9	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	1,780
10	120165	CHANNELIZER (SURFACE MOUNTED)	EA	35
11	120300	TEMPORARY PAVEMENT MARKER	EA	38
12	128652	PORTABLE CHANGEABLE MESSAGE SIGN (LS)	LS	LUMP SUM
13	129000	TEMPORARY RAILING (TYPE K)	LF	4,470
14	129100	TEMPORARY CRASH CUSHION MODULE	EA	75
15	130100	JOB SITE MANAGEMENT	LS	LUMP SUM
16	130300	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
17	130310	RAIN EVENT ACTION PLAN	EA	22
18	130320	STORM WATER SAMPLING AND ANALYSIS DAY	EA	15
19	026044	WATER QUALITY SAMPLING AND ANALYSIS DAY	EA	260
20	026045	CORRUGATED STEEL PANEL	EA	26

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
21	130330	STORM WATER ANNUAL REPORT	EA	1
22	026046	WATER QUALITY MONITORING REPORT	EA	14
23	130530	TEMPORARY HYDRAULIC MULCH (BONDED FIBER MATRIX)	SQYD	3,000
24	BLANK			
25	130620	TEMPORARY DRAINAGE INLET PROTECTION	EA	1
26	BLANK			
27	130640	TEMPORARY FIBER ROLL	LF	500
28	130670	TEMPORARY REINFORCED SILT FENCE	LF	2,100
29	130730	STREET SWEEPING	LS	LUMP SUM
30	BLANK			
31	130900	TEMPORARY CONCRETE WASHOUT	LS	LUMP SUM
32	026049	EXCAVATION AND TRANSPORTATION PLAN	LS	LUMP SUM
33	141000	TEMPORARY FENCE (TYPE ESA)	LF	2,370
34	141001	HEALTH AND SAFETY PLAN	LS	LUMP SUM
35	141103	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE (HAZARDOUS WASTE)	LF	1,450
36	141120	TREATED WOOD WASTE	LB	5,000
37	150202	CORE AND PRESSURE GROUT DOWEL	LF	1,035
38	150227	ABANDON PIPELINE	EA	1
39	150605	REMOVE FENCE	LF	460
40	150661	REMOVE GUARDRAIL	LF	160

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
41	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	2,430
42	150715	REMOVE THERMOPLASTIC PAVEMENT MARKING	SQFT	270
43	150722	REMOVE PAVEMENT MARKER	EA	140
44	150744	REMOVE ROADSIDE SIGN (WOOD POST)	EA	1
45	150747	REMOVE ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	1
46	152320	RESET ROADSIDE SIGN	EA	3
47	152393	RELOCATE ROADSIDE SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	1
48	153103	COLD PLANE ASPHALT CONCRETE PAVEMENT	SQYD	760
49	153123	REMOVE CONCRETE (SQYD)	SQYD	50
50	153221	REMOVE CONCRETE BARRIER	LF	330
51	153226	REFINISH BRIDGE DECK	SQFT	4
52	156585	REMOVE CRASH CUSHION	EA	1
53	157550	BRIDGE REMOVAL	LS	LUMP SUM
54	157560	BRIDGE REMOVAL (PORTION)	LS	LUMP SUM
55	160102	CLEARING AND GRUBBING (LS)	LS	LUMP SUM
56	170101	DEVELOP WATER SUPPLY	LS	LUMP SUM
57	190101	ROADWAY EXCAVATION	CY	1,920
58 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	CY	570
59 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	CY	117.6
60 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	6

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
61 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	73.4
62 (F)	044369	LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE) (CLASS III)	CY	1,070
63 (F)	044370	CLASS 3 PERMEABLE MATERIAL	CY	65
64	044371	IMPORTED BORROW (LIGHTWEIGHT AGGREGATE)	CY	35
65	198050	EMBANKMENT	CY	240
66	198209	SUBGRADE ENHANCEMENT GEOTEXTILE CLASS B2	SQYD	480
67	198250	GEOSYNTHETIC REINFORCEMENT	SQYD	120
68	200002	ROADSIDE CLEARING	LS	LUMP SUM
69	204099	PLANT ESTABLISHMENT WORK	LS	LUMP SUM
70	210010	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	5
71	210210	EROSION CONTROL (DRY SEED) (SQFT)	SQFT	58,000
72	210270	ROLLED EROSION CONTROL PRODUCT (NETTING)	SQFT	23,000
73	210300	HYDROMULCH	SQFT	156,000
74	210350	FIBER ROLLS	LF	5,820
75	BLANK			
76	210430	HYDROSEED	SQFT	97,500
77	210600	COMPOST	SQFT	156,000
78	210630	INCORPORATE MATERIALS	SQFT	132,000
79	250401	CLASS 4 AGGREGATE SUBBASE	CY	810
80	260303	CLASS 3 AGGREGATE BASE (CY)	CY	710

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
81	390132	HOT MIX ASPHALT (TYPE A)	TON	1,000
82	394073	PLACE HOT MIX ASPHALT DIKE (TYPE A)	LF	1,740
83	394090	PLACE HOT MIX ASPHALT (MISCELLANEOUS AREA)	SQYD	35
84	490591	60" PERMANENT STEEL CASING	LF	913
85	490609	60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	913
86	044372	54" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	370
87	490801	STEEL SHEET PILING	SQFT	5,260
88	495115	FURNISH 24" CAST-IN-STEEL SHELL CONCRETE PILING	LF	1,550
89	495116	DRIVE 24" CAST-IN-STEEL SHELL CONCRETE PILE	EA	20
90 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	1,713
91 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	72.6
92 (F)	511064	FRACTURED RIB TEXTURE	SQFT	1,100
93	511106	DRILL AND BOND DOWEL	LF	1,713
94	511110	DRILL AND BOND DOWEL (CHEMICAL ADHESIVE)	EA	10
95	519088	JOINT SEAL (MR 1")	LF	58
96	519095	JOINT SEAL ASSEMBLY (MR 4")	LF	32
97	519102	JOINT SEAL (TYPE AL)	LF	52
98 (F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	808,520
99 (F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	3,798
100 (F)	550102	STRUCTURAL STEEL (BRIDGE)	LB	284,425

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
101	560248	FURNISH SINGLE SHEET ALUMINUM SIGN (0.063"-UNFRAMED)	SQFT	24
102	560249	FURNISH SINGLE SHEET ALUMINUM SIGN (0.080"-UNFRAMED)	SQFT	48
103	562002	METAL (BARRIER MOUNTED SIGN)	LB	360
104	566011	ROADSIDE SIGN - ONE POST	EA	6
105	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	1
106	590115	CLEAN AND PAINT STRUCTURAL STEEL	LS	LUMP SUM
107	044373	CLEAN AND PAINT PILING	LS	LUMP SUM
108	044374	GEOMEMBRANE	SQYD	290
109	721810	SLOPE PAVING (CONCRETE)	CY	17
110 (F)	750498	MISCELLANEOUS METAL (RESTRAINER - CABLE TYPE)	LB	36,000
111 (F)	750505	BRIDGE DECK DRAINAGE SYSTEM	LB	880
112	800103	TEMPORARY FENCE (TYPE CL-6)	LF	750
113	800302	CHAIN LINK FENCE (TYPE CL-3, VINYL-CLAD)	LF	30
114	800360	CHAIN LINK FENCE (TYPE CL-6)	LF	340
115	802620	16' CHAIN LINK GATE (TYPE CL-6)	EA	1
116	026050	TEMPORARY 16' CHAIN LINK GATE (TYPE CL-6)	EA	1
117	026051	CONCRETE BARRIER MARKER	EA	160
118	820107	DELINEATOR (CLASS 1)	EA	14
119	820118	GUARD RAILING DELINEATOR	EA	36
120	820134	OBJECT MARKER (TYPE P)	EA	2

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
121	820190	SPECIAL MARKER	EA	4
122	832016	MIDWEST GUARDRAIL SYSTEM (7' POST)	LF	880
123	832070	VEGETATION CONTROL (MINOR CONCRETE)	SQYD	440
124 (F)	833136	CONCRETE BARRIER (TYPE 25R MODIFIED)	LF	4
125	839543	TRANSITION RAILING (TYPE WB-31)	EA	3
126	839576	END CAP (TYPE A)	EA	1
127	839584	ALTERNATIVE IN-LINE TERMINAL SYSTEM	EA	1
128	839585	ALTERNATIVE FLARED TERMINAL SYSTEM	EA	1
129	026052	CRASH CUSHION (TYPE SCL-100GM)	EA	1
130	839703	CONCRETE BARRIER (TYPE 60C)	LF	550
131	839704	CONCRETE BARRIER (TYPE 60D)	LF	37
132	026053	PORTABLE CONCRETE BARRIER (TYPE 60K)	LF	330
133 (F)	839723	CONCRETE BARRIER (TYPE 732B)	LF	9.5
134 (F)	044375	CONCRETE BARRIER (TYPE 742 MODIFIED)	LF	1,360
135	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	6,190
136	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	840
137	840508	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	300
138	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	470
139	850111	PAVEMENT MARKER (RETROREFLECTIVE)	EA	190
140	860090	MAINTAINING EXISTING TRAFFIC MANAGEMENT SYSTEM ELEMENTS DURING CONSTRUCTION	LS	LUMP SUM

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity
141	860150	SIGNAL AND LIGHTING (TEMPORARY)	LS	LUMP SUM
142	860201	SIGNAL AND LIGHTING	LS	LUMP SUM
143	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
144	026054	TRAFFIC OPERATIONS SYSTEM	LS	LUMP SUM
145	BLANK			
146	026926	TEMPORARY STORM WATER RUN-ON BYPASS AND DEWATERING SYSTEM	LS	LUMP SUM
147	026927	RECONSTRUCT DOWNDRAINS	LS	LUMP SUM
148	026928	SPECIES PROTECTION	LS	LUMP SUM
149	190185	SHOULDER BACKING	TON	18
150	194001	DITCH EXCAVATION	CY	93
151	198010	IMPORTED BORROW	CY	66
152	202006	SOIL AMENDMENT	CY	16
153	202038	PACKET FERTILIZER	EA	430
154	204009	PLANT (GROUP I)	EA	430
155	204013	PLANT (M)	EA	1,790
156	205035	WOOD MULCH	CY	50
157	205051	FOILAGE PROTECTOR	EA	430
158	026929	IMPORTED BIOFILTRATION SOIL	CY	64
159	210280	ROLLED EROSION CONTROL PRODUCT (BLANKET)	SQFT	58,000
160	680902	6" PERFORATED PLASTIC PIPE UNDERDRAIN	LF	120

<b>Item No.</b>	<b>Item Code</b>	<b>Item Description</b>	<b>Unit of Measure</b>	<b>Estimated Quantity</b>
161	680903	6" NON-PERFORATED PLASTIC PIPE UNDERDRAIN	LF	120
162 (F)	720110	SMALL-ROCK SLOPE PROTECTION	CY	1.3
163	721420	CONCRETE (DITCH-LINING)	CY	2
164	729011	ROCK SLOPE PROTECTION FABRIC (CLASS 8)	SQYD	190
165	999990	MOBILIZATION 10%	LS	LUMP SUM



To attend the meeting, register one of the following ways:

1. Register through the District 4 duty senior at:
  1. District 4 office
  2. duty\_senior\_district04@dot.ca.gov
2. Register at;
 

<http://www.dot.ca.gov/dist4/construction/contracts/04-3A8704/tour/tour.html>

A sign-up sheet will be used to identify the attendees.

The Department provides transportation and access to the job site. Provide your own safety gear, including appropriate footwear, hardhats, eye protection, and gloves.

**Add to section 2-1.06B:**

The Department makes the following supplemental project information available:

**Supplemental Project Information**

Means	Description
Included in <i>Information Handout</i>	1. Railroad Relations and Insurance Requirements 2. USACE 404 Permit 3. CDFW agreements 3A. CDFW agreements, Amendment, November 14, 2013 4. California RWQCB Section 401 Water Quality Certification 5. USFWS Biological Opinion March 9, 2011 6. USFWS Biological Opinion December 26, 2012 6A. USFWS Biological Opinion November 27, 2013 7. Portions of-Subsurface Investigation Report Dated April 12, 2012 8. Water Quality Information Handout 9. Revised Final Foundation Report for Mococo Off-Ramp Replacement, Bridge No. 28-0171S dated October 16, 2012 10. Foundation Report for Roadway Embankment/sheetpiles for Mococo Off-Ramp Replacement, Bridge No. 28-0171S dated September 6, 2012 11. Structure Hydraulics Review for Mococo Overhead (Retrofit) and Off-Ramp (Replace), Bridge No. 28-0171 & 28-0171S dated May 18, 2012 12. Final Seismic Design Recommendations and Soil Springs for Mococo Off-Ramp Replacement, Bridge No. 28-0171S dated October 8, 2012 13. Underground classification 14. Geotechnical Laboratory Test Results
Available as specified in the <i>Standard Specifications</i>	Cross sections Bridge as-built drawings
Available for inspection at the Transportation Laboratory	Rock Cores
Available for inspection at the District Office Telephone no.: (510) 286-5209	Subsurface investigation report

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## 5 CONTROL OF WORK

### Add to section 5-1.09A:

The Department encourages the project team to exhaust the use of partnering in dispute resolution before engagement of an objective third party.

For certain disputes, a facilitated partnering session or facilitated dispute resolution session may be appropriate and effective in clarifying issues and resolving all or part of a dispute.

To afford the project team enough time to plan and hold the session, a maximum of 20 days may be added to the DRB referral time following the Engineer's response to a *Supplemental Potential Claim Record*.

To allow this additional referral time, the project team must document its agreement and intention in the dispute resolution plan of the partnering charter. The team may further document agreement of any associated criteria to be met for use of the additional referral time.

If the session is not held, the DRB referral time remains in effect as specified in section 5-1.43.

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## 6 CONTROL OF MATERIALS

### Add to section 6-2.03:

The Department furnishes you with:

- Model 170E controller assembly, including controller unit, completely wired controller cabinet, and detector sensor units

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit at Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500. At least 48 hours before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

AA

## 7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

### Replace section 7-1.02K(6)(e) with:

#### 7-1.02K(6)(e) Scaffolding

#### 7-1.02K(6)(e)(i) General

Section 7-1.02K(6)(e) applies to scaffolding constructed (1) over traffic, (2) on or suspended from a bridge, or (3) within a distance equal to the scaffolding height plus 6 feet from the edge of a traveled way open to traffic, except section 7-1.02K(6)(e) does not apply to scaffolding at sound walls, retaining walls, and buildings.

Submit 6 copies of shop drawings and 1 copy of calculations.

The shop drawings and calculations must be sealed and signed by:

1. Engineer who is registered as a civil engineer
2. Independent reviewer who is:
  - 2.1. Registered as a civil engineer in the State
  - 2.2. Not employed by the same entity that prepared the drawings

Include in the submittal:

1. Descriptions, calculations, and values for loads anticipated during erection, use, and removal of the scaffolding.
2. Methods and equipment for erecting, moving, and removing scaffolding.
3. Design details, including bolt layouts, welding details, and connections to existing structures.
4. Stress sheets, including a summary of computed stresses in the scaffolding and in the connections between the scaffolding and existing structures. The computed stresses must include the effects of erection, movement, and removal of the scaffolding.

If manufactured scaffolding is used, the manufacturer's name, address, and telephone number must be shown on the shop drawings.

Allow 40 days for the Department's review.

Welding must comply with AWS D1.1 for steel and AWS D1.2 for aluminum.

**7-1.02K(6)(e)(ii) Bridge Scaffolding**

Section 7-1.02K(6)(e)(ii) applies to scaffolding constructed on or suspended from a bridge.

The available bridge load capacity in excess of the dead and live load demand is shown in the following table. The available capacity is a uniform load across the entire bridge width and is based on the design live load shown.

Bridge number	Available load capacity (lb/sq ft)	Bridge width (ft)	Design live load
28-0171L	225	±46.5	IPC

Calculations must include:

1. Moment and shear force demands versus capacity during erection, movement, and removal of the scaffolding on the longitudinal girders of girder bridges and the flooring system of stringers and floor beams of truss bridges.
2. Tension and compression force demands versus capacity of truss members of truss bridges during erection, movement, and removal of the scaffolding.

Scaffolding loads must not exceed the load-carrying capacity of the existing members. Determine the capacity of existing members under the Department's *Bridge Design Specifications, Load Factor Design Version, April 2000*. Use the group load factors shown in the following table:

Group	Gamma factor	Beta factors		
		D	(L+I)H	(L+I)P
$I_H^a$	1.3	1	1	0
$I_{PC}^b$	1.3	1	0	1
$I_{PW}^c$	1.3	1	1	1.15

<sup>a</sup>H denotes HS-20 loads

<sup>b</sup>PC denotes P loads on closely spaced girders

<sup>c</sup>PW denotes P loads on widely spaced girders

For truss-type bridges, all connections must be made through stringers, floor beams, or truss panel points, and no connections are allowed that may cause bending stresses in a truss member.



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**9 PAYMENT**

**Add to section 9-1.16C:**

The following items are eligible for progress payment even if they are not incorporated into the work:

- 1. Railings
- 2. Signal and Lighting Standards
- 3. Piling (except CIDH Piling)
- 4. Type B Joint Seals and Joint Seal Assemblies
- 5. Bar Reinforcing Steel
- 6. Structural Steel
- 7. Miscellaneous Bridge Metal
- 8. Fences and Gates
- 9. Underdrain Pipe

AA

**DIVISION II GENERAL CONSTRUCTION**

**10 GENERAL**

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

Notify Brian Deshew, Field Services Coordinator of Shell Pipeline Company, LP (209) 834-8794 at least 48 hours before beginning any construction activity around SHELL Oil Company facilities and any other activities affecting access to their property or facilities to arrange for field marking locations of the company's facilities.

Replacement of cable restrainers must comply with section 75-1.03E(2)(a).

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.

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

You may work on the ground in the work area shown within the ESA only from February 1, 2015 to October 15, 2015.

**Add to section 10**

**10-3 TEMPORARY CONSTRUCTION ACCESS**

**10-3.01 GENERAL**

**10-3.01A Summary**

Section 10-3 includes specifications for temporary construction access (TCA). Plan, construct, maintain, and remove temporary construction access at locations 1, 2 and 3.

TCA construction, maintenance, and removal must comply with PLACs. Do not use gravel on the TCA and staging areas adjacent to the wetlands and tidal channel. Prevent gravel from being deposited in the wetlands and tidal channel. Do not work within the tidal channel.

### **10-3.01B Submittals**

Within 15 days after contract approval, submit 5 copies of a TCA plan for each location under section 5-1.23B(2). TCA plan must include:

1. Shop drawings and supporting calculations for all work needed to construct, maintain and remove TCA, including shoring, bracing, or foundations, if required, and grading, drainage, surfacing materials, fencing, restoration work and post construction stabilization.
2. Schedule of construction activities (earthwork must occur from February 1 to October 15).
3. All existing traffic, utilities, ditches, tidal channel, and railroad property, where located adjacent to the TCA.
4. Locations and types of protective covers over utilities, ditches, tidal channel and environmentally sensitive areas.

To make a change to an authorized TCA plan, submit it as specified for a new submittal. Note the changes.

### **10-3.01C Implementation Requirements**

You may start water pollution control work before the TCA plan is authorized, but it must be authorized before start of earthwork.

Keep a copy of the current authorized TCA plan at the job site.

### **10-3.02 MATERIALS**

Not Used.

### **10-3.03 CONSTRUCTION**

Not Used.

### **10-3.04 PAYMENT**

Not Used

## **Add to section 10:**

### **10-4 TEMPORARY TIMBER CONSTRUCTION MAT**

#### **10-4.01 GENERAL**

##### **10-4.01A Summary**

Section 10-4 includes specifications for planning, constructing, maintaining, and removing temporary timber construction mat (the mat) to cross wetlands.

##### **10-4.01B Definitions**

**temporary timber construction mat:** Device placed temporarily on a wetland to provide access to the work and minimize damage to the wetland soils and habitat.

##### **10-4.01C Submittals**

Within 15 days after Contract approval submit 3 copies of the mat plan under section 5-1.23B(2).

When the Engineer authorizes the mat plan submit an electronic copy and 4 printed copies of the authorized mat plan. The mat plan must include:

1. Shop drawings and supporting calculations for all work needed to construct, maintain, and remove the mat including location and material.
2. Installation and removal methods.
3. Wetland restoration plan. Include printed and digital time-date stamped photos of existing original wetland conditions for areas where the mat will be placed.
4. Schedule for the installation and removal of the mat.

Submit daily progress reports of the mat installation, removal, and wetland restoration work along with time-date stamped digital photos within one working day of taking them. Photos must show the wetland area along with the work progress each day during installation and removal of the mat, and comparisons to the original wetland conditions after you complete the mat removal and wetland restoration.

## **10-4.02 MATERIALS**

### **10-4.02A Mat**

Design the mat for use as temporary construction roadway and staging support, and to protect the ground. The mat consists of timbers, connecting hardware, filter fabric, plywood, subgrade enhancement geotextile, or authorized alternative materials. If the RWQCB and the USFWS approves and the Engineer authorizes, you may use alternative materials.

Design and construct the mat with sufficient strength and rigidity to support all imposed loads. Design the mat for a maximum ground stress of 500 psf or less if needed for stability of the mat under all loads to be imposed by the work. The mat must prevent any materials, equipment, or debris from falling onto wetlands. The mat must be free of all soil, seeds, or other organic or hazardous material before entering the work area.

### **10-4.02B Filter Fabric**

Comply with section 88-1.02B.

### **10-4.02C Temporary Subgrade Enhancement Geotextile**

Subgrade enhancement geotextile must be Class B1 and comply with section 88-1.02O.

### **10-4.02D Plywood**

Plywood must be structural plywood manufactured with:

1. Plies glued perpendicular to each other
2. Knots removed and repaired
3. Adhesives for wet use

Chipboard is not allowed. Plywood must be secured to timber with either nails or bolts.

### **10-4.02E Timber and Connector Rods**

Timber must be untreated. Timbers must be connected to each other with connector rods.

## **10-4.03 CONSTRUCTION**

### **10-4.03A General**

Prevent damage to wetlands under section 5-1.36A and according to PLAC requirements.

### **10-4.03B Installation**

Do not install the mat in a wetland or cross the wetland until authorized. Do not begin installing the mat if the National Weather Service predicts at least a 50 percent probability of precipitation within 72 hours.

Conduct all temporary installation activities away from wetlands or on the mat. You may perform grading within the temporary impact areas allowed in the PLACs. Grading must not exceed the minimum necessary for the mat installation.

Provide a continuous cover with the mat where you work over wetlands. Seal all openings in the mat around columns and any other objects that extend through the mat. Span across all joints in the mat with filter fabric.

### **10-4.03C Maintenance**

Inspect, clean, and maintain the mat. Immediately replace or repair damaged or broken sections of the mat. Remove debris from the mat surface daily and handle debris under section 13-4.03D.

### **10-4.03D Removal**

Remove the mat when wetland crossing is no longer needed. Load mat components onto trucks and, if necessary to prevent spillage or tracking, wash the mat components along with the trucks under section 13-4.03E(3) before transporting them offsite.

## **10-4.04 PAYMENT**

Not Used

**Add to section 10:**

**10-5 TEMPORARY CONSTRUCTION TRESTLE**

**10-5.01 GENERAL**

**10-5.01A General**

Section 10-5 includes specifications for optional temporary construction trestle (TCT). You may construct TCT as an alternative to temporary timber construction mat where shown. Design, construct, maintain and remove TCT.

TCT construction, maintenance, and removal must comply with PLACs. Prevent any debris from falling into wetlands and tidal channel and protect temporary cofferdam enclosure.

Do not work within the tidal channel.

Do not use gravel on the staging areas adjacent to wetlands and tidal channel.

Do not use TCT and Temporary Timber Construction Mat (TTCM) as described in Section 10-4 at the same location.

The TCT must:

1. Not be more than 24 feet wide.
2. Have a non-slip surface for both workers and vehicles.
3. Be designed to meet the Contractor's vehicles, equipments, and construction loads.

**10-5.01B Submittals**

Within 15 days after Contract approval, submit 5 copies of the temporary construction trestle plan (TCTP). TCTP must include:

1. Shop drawings and supporting calculations for all work including foundations, bracings, and decking needed to support the anticipated loads needed to perform the work.
2. Locations and the materials used.
3. All existing roadways, utilities, ditches, tidal channel, wetlands and railroad property adjacent TCT.
4. Locations and types of protective covers over utilities, ditches, tidal channel and environmentally sensitive areas.
5. Schedule for the installation and removal of TCT.
6. Photographs of existing conditions at locations where TCT will be constructed.

To make a change to an authorized TCTP, submit it as specified for a new submittal.

Keep a copy of the authorized TCTP at the job site.

**10-5.02 Materials**

Not Used

**10-5.03 Construction**

TCT must be removed and disposed of when wetland crossing is no longer required. Temporary fills must be removed in their entirety and the affected areas restored to their original conditions.

**10-5.04 Payment**

Not Used

AA

## 12 TEMPORARY TRAFFIC CONTROL

### Replace 1st paragraph in section 12-3.06B(1) with:

Construction area warning and guide signs must have a black legend on a retroreflective, nonfluorescent-orange background. W10-1 advance warning sign for highway-rail grade crossings must have a black legend on a retroreflective, nonfluorescent-yellow background.

### 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
4. Speed reduction zone

For 5 days, starting on the day of signal activation, place 1 portable changeable message sign in each direction of travel and display the following message: "SIGNAL AHEAD -- PREPARE TO STOP."

### 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.

Do not use an impact attenuator vehicle to place and remove components of a stationary traffic control system on freeway where the useable shoulder width is less than 8 feet.

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.

### **12-3.13D Payment**

Not Used

#### **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 and grooving operations, saw cutting concrete slabs, and installing loop detectors, closure of the adjacent traffic lane is not required if an impact attenuator vehicle is used as a shadow vehicle.

Designated holidays are 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: the third Monday in January.

For a one-way reversing traffic-control lane closure, traffic may be stopped in 1 direction for periods not to exceed 5 minutes. After each stoppage, all accumulated traffic for that direction must pass through the work zone before another stoppage is made.

The maximum length of a single stationary one-way reversing traffic-control lane closure is 0.25 miles between flaggers.

The maximum length of the work area inside a lane closure other than one-way reversing traffic-control lane closure is 0.5 miles. Work area is as shown.

Not more than 2 stationary lane closures will be allowed in each direction of travel at one time. Concurrent stationary closures in the same direction of travel must be spaced no closer than 2 miles apart. Closures in the same direction of travel on alternating inside lane/outside lanes must be spaced by an additional 2 miles.

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.

**Add to the RSS for section 12-4.03B:**

For each 10-minute interval or fraction thereof past the time specified to open the closure, the Department deducts the amount for liquidated damages per interval shown in the table below. Liquidated damages are limited to 5 percent of the total bid per occurrence. Liquidated damages are not assessed if the Engineer orders the closure to remain in place beyond the scheduled pickup time.

Type of facility	Route	Direction or Segment	Period	Liquidated damages/interval (\$)
Mainline	680		1st half hour	\$2,000 / 10 minutes
			2nd half hour	\$3,000 / 10 minutes
			2nd hour and beyond	\$4,000 / 10 minutes
Ramp	680		1st half hour	\$1,000 / 10 minutes
			2nd half hour	\$1,000 / 10 minutes
			2nd hour and beyond	\$1,000 / 10 minutes

**Replace "Sunday" at each occurrence in the 1st paragraph of the RSS for section 12-4.03B with: Friday**

**Add to the RSS for section 12-4.03C:**

Submit a contingency plan for each of the following activities:

1. I-680 Southbound Off-Ramp Closure
2. HMA Paving
3. Cold planning HMA
4. Bridge work
5. Bridge demolition

Discuss the contingency plan with the Engineer at least 5 business days before starting the activity.

**Replace the 5th paragraph of the RSS for section 12-4.03C with:**

Submit revisions to a contingency plan at least 5 business days before starting the activity requiring a contingency plan. Allow 2 business days for review of the revised contingency plan.

**Replace "Reserved" in section 12-4.04 with:**

<b>Lane Closure Restriction for Designated Holidays and Special Days</b>										
Thu	Fri	Sat	Sun	Mon	Tues	Wed	Thu	Fri	Sat	Sun
x	<b>H</b> xx	xx	xx							
	<b>SD</b> xx									
x	xx	<b>H</b> xx	xx							
		<b>SD</b> xx								
	x	xx	<b>H</b> xx	xx						
			<b>SD</b> xx							
	x	xx	xx	<b>H</b> xx	xxx					
	x	xx	xx	<b>SD</b> xx	xxx					
				x	<b>H</b> xx					
				x	<b>SD</b> xx					
					x	<b>H</b> xx				
						<b>SD</b> xx				
						x	<b>H</b> xx	xx	xx	xx
							<b>SD</b> xx			
<b>Legend:</b>										
	Refer to lane requirement charts									
x	The full width of the traveled way must be open for use by traffic after 5:00 am.									
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 8:00 am.									
<b>H</b>	Designated holiday									
<b>SD</b>	Special day									

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

Chart no. 1 Freeway Lane Requirements																									
County: Contra Costa						Route/Direction: 680 Southbound						PM: 23.9 to 25.0													
Closure limits: 0.5 mile South and 0.6 mile North of Marina Vista Ave off-ramp																									
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
Mon-Thu	1	1	1	1	1	S				S	S	S	S	S					S	2	2	1	1	1	
Fri	1	1	1	1	1	S				S	S	S	S	S					S	S	2	2	2	1	
Sat	1	1	1	1	1	1	2	2	2	S	S	S	S	S					S	S	2	2	2	2	
Sun	1	1	1	1	1	1	1	1	2	2	S	S									S	S	2	1	

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)
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS: Shoulder closure is restricted to traffic cones six feet off travel way.

Chart no. 2 Freeway Lane Requirements																									
County: Contra Costa						Route/Direction: 680 Northbound						PM: 23.8 to 24.3													
Closure limits: 0.5 mile South of Marina Vista Ave on-ramp to the ramp																									
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
Mon-Thu	2	2	2	2	2																	2	2	2	2
Fri	2	2	2	2	2																		2	2	2
Sat	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3				3	3	2	2	2	2	
Sun	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2

Legend:

2	Provide at least 2 adjacent through freeway lanes open in direction of travel
3	Provide at least 3 adjacent through freeway lanes open in direction of travel
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS: Closure is allowed only in Lane-1, Lane-2, and Lane-3.

Chart no. 3 Freeway Lane Requirements																									
County: Contra Costa					Route/Direction: 680 Northbound										PM: 24.3 to 24.6										
Closure limits: Marina Vista Ave on-ramp to the Benicia-Martinez Bridge Toll Plaza																									
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
Mon-Thu	4	4	4	4	4																	4	4	4	4
Fri	4	4	4	4	4																		4	4	4
Sat	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sun	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Legend:

4	Provide at least 4 adjacent through freeway lanes open in direction of travel
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS: 1) Closure is only in Lane-1 and HOV-Lane, including Toll Plaza area. All other lanes must be open during closure period within the closure limits, including the toll plaza vicinity.  
2) Two weeks prior to the closure, obtain concurrence from Toll Bridge Captain.

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

Chart no. 4 Complete Ramp Closure Hours/Ramp Lane Requirements																									
County: Contra Costa					Route/Direction: 680 Southbound										PM: 24.39										
Closure limits: Marina Vista off-ramp																									
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
Mon-Thu	C	C	C	C	C					S	S	S	S	S	S	S					C	C	C	C	C
Fri	C	C	C	C	C					S	S	S	S	S	S	S					C	C	C	C	C
Sat	C	C	C	C	C	S	S	S	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	C
Sun	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	S	S	C	C	C	C	C	C	C

Legend:

C	Ramp may be closed completely
S	Shoulder closure allowed
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS: 1) Use ramp closure Detour No. 3.  
2) Shoulder closure on ramp structure not permitted.

Chart no. 5																									
Complete Ramp Closure Hours/Ramp Lane Requirements																									
County: Contra Costa							Route/Direction: 680 Southbound							PM: 24.26											
Closure limits: Marina Vista on-ramp																									
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
Mon-Thu	C	C	C	C	C	C	S	S	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	
Fri	C	C	C	C	C	C	S	S	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	
Sat	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Sun	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Legend:																									
C Ramp may be closed completely																									
S Shoulder closure allowed																									
Work allowed within the highway where shoulder or lane closure is not required																									
REMARKS: Use ramp closure Detour No. 1.																									

Chart no. 6																									
Complete Ramp Closure Hours/Ramp Lane Requirements																									
County: Contra Costa							Route/Direction: 680 Southbound							PM: 22.81											
Closure limits: Arthur Rd off-ramp																									
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
Mon-Thu	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	
Fri	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	
Sat	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Sun	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Legend:																									
C Ramp may be closed completely																									
S Shoulder closure allowed																									
Work allowed within the highway where shoulder or lane closure is not required																									
REMARKS: 1) Advance signing must be used to notify traffic to use upstream off-ramp. 2) This ramp must stay open during the four-month closure of Southbound Marina Vista off-ramp.																									

Chart no. 7 Complete Ramp Closure Hours/Ramp Lane Requirements																									
County: Contra Costa					Route/Direction: 680 Northbound										PM: 22.83										
Closure limits: Arthur Rd on-ramp																									
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
Mon-Thu	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	S	S	S	C	C	C	C	C	C	C
Fri	C	C	C	C	C	C	S	S	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	C
Sat	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
Sun	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
Legend:																									
<input type="checkbox"/> C Ramp may be closed completely <input type="checkbox"/> S Shoulder closure allowed <input type="checkbox"/> Work allowed within the highway where shoulder or lane closure is not required																									
REMARKS: Use ramp closure Detour No. 2.																									

Chart no. 8 Complete Ramp Closure Hours/Ramp Lane Requirements																									
County: Contra Costa					Route/Direction: 680 Northbound										PM: 23.73										
Closure limits: Marina Vista off-ramp																									
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
Mon-Thu	C	C	C	C																				C	C
Fri	C	C	C	C																					C
Sat	C	C	C	C																					C
Sun	C	C	C	C																				C	C
Legend:																									
<input type="checkbox"/> C Ramp may be closed completely <input type="checkbox"/> Work allowed within the highway where shoulder or lane closure is not required																									
REMARKS: 1) Use ramp closure Detour No. 4 with advance signage. 2) No concurrent Southbound Marina Vista Rd off-ramp closure.																									

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

Chart no. 9 Conventional Highway Lane Requirements																									
County: Contra Costa							Route/Direction: Arthur Road							PM:											
Closure limits: 250 feet to each side of the I-680 structure.																									
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
Mon-Thu	R	R	R	R	R	R				R	R	R	R	R	R				R	R	R	R	R	R	R
Fri	R	R	R	R	R	R				R	R	R	R	R	R				R	R	R	R	R	R	R
Sat	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Sun	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

Legend:

R	Provide at least 1 through traffic lane, not less than 10 feet in width, for use by both directions of travel (Reversing Control)
	Work allowed within the highway where shoulder or lane closure is not required

Chart no. 10 Conventional Highway Lane Requirements																									
County: Contra Costa							Route/Direction: Mococo Road							PM:											
Closure limits: 150 feet to each side of the Southbound I-680 structure.																									
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
Mon-Thu	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R
Fri	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R
Sat	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R
Sun	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R

Legend:

R	Provide at least 1 through traffic lane, not less than 10 feet in width, for use by both directions of travel (Reversing Control)
	Work allowed within the highway where shoulder or lane closure is not required

REMARKS: 1) Reversing control chart may include complete closure for not more than 15 minutes followed by reversing control to flush out traffic.  
2) Reversing control chart shall occur for not more than two events: set-up scaffolding & break-down scaffolding.  
3) Closures shall not occur on "Turnaround Times" in the month of March.

Chart no. 11 Conventional Highway Lane Requirements																												
County: Contra Costa							Route/Direction: Marina Vista Rd							PM:														
Closure limits: 250 feet to each side of the I-680 structure.																												
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			
Mon-Thu											R	R	R	R	R	R												
Fri											R	R	R	R	R	R												
Sat																												
Sun																												
Legend:																												
<table border="0"> <tr> <td style="border: 1px solid black; width: 20px; height: 20px; text-align: center;">R</td> <td>Provide at least 1 through traffic lane, not less than 10 feet in width, for use by both directions of travel (Reversing Control)</td> </tr> <tr> <td style="border: 1px solid black; width: 20px; height: 20px;"></td> <td>Work allowed within the highway where shoulder or lane closure is not required</td> </tr> </table>																									R	Provide at least 1 through traffic lane, not less than 10 feet in width, for use by both directions of travel (Reversing Control)		Work allowed within the highway where shoulder or lane closure is not required
R	Provide at least 1 through traffic lane, not less than 10 feet in width, for use by both directions of travel (Reversing Control)																											
	Work allowed within the highway where shoulder or lane closure is not required																											
REMARKS:																												

**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 and moving lane closures on multilane highways and 2-lane, 2-way 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**

Vehicles equipped with attenuators must comply with section 12-3.13 of the special provisions.

**12-5.03 CONSTRUCTION**

**12-5.03A General**

During traffic striping and pavement marker placement using bituminous adhesive, control traffic with a stationary or a moving lane closure. During other activities, control traffic with stationary lane closures.

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.

**12-5.03B Stationary Lane Closures**

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.

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.

#### **12-5.03C Moving Lane Closures**

A changeable message sign used in a moving lane closure must comply with section 12-3.12 except the sign must be truck-mounted. The full operational height to the bottom of the sign may be less than 7 feet above the ground but must be as high as practicable.

A flashing arrow sign used in a moving lane closure must be truck-mounted. Operate the flashing arrow sign in the caution display mode whenever it is being used on a 2-lane, 2-way highway.

#### **12-5.04 PAYMENT**

Traffic control system for lane closure is paid for as traffic control system. Flagging costs are paid for as specified in section 12-1.03.

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 temporary pavement markers on the Authorized Material List for short-term day/night use, 14 days or less, or long-term day/night use, 180 days or less. 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 tape 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 tape 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**

Temporary traffic stripe tape must be one of the types of temporary, removable striping tape on the Authorized Material List.

### **12-8.02E Temporary Traffic Stripe Paint**

Not Used

### **12-8.02F Temporary Pavement Marking Tape**

Temporary pavement marking tape must be one of the types of temporary, removable pavement marking tape on the Authorized Material List and must be applied and removed as specified for applying and removing temporary, removable traffic stripe tape.

### **12-8.02G Temporary Pavement Marking Paint**

You may use one of the types of temporary removable pavement marking tape or permanent pavement marking tape on the Authorized Material List instead of temporary pavement marking paint.

### **12- 8.02H Temporary Pavement Markers**

Temporary pavement markers must be one of the temporary pavement markers on the Authorized Material List for long term day/night use, 180 days or less.

## **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 or removable traffic tape 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.

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, and removable traffic tape 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 one 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**

Apply temporary traffic stripe tape under the manufacturer's instructions. Slowly roll the tape with a rubber-tired vehicle or roller to ensure complete contact with the pavement surface. Apply the tape straight on a tangent alignment and on a true arc on a curved alignment. Do not apply the tape when the air or pavement temperature is less than 50 degrees F unless the installation procedures are authorized beforehand.

The temporary traffic stripe tape must be complete in place at the location shown before opening the traveled way to traffic.

#### **12-8.03E Temporary Traffic Stripe Paint**

Apply 1 or 2 coats of temporary traffic stripe paint for new or existing pavement.

The painted temporary traffic stripe must be complete in place at the location shown before opening the traveled way to traffic.

#### **12-8.03F Temporary Pavement Marking Tape**

Apply temporary pavement marking tape at the locations shown. The tape must be complete in place at the location shown before opening the traveled way to traffic.

#### **12-8.03G Temporary Pavement Marking Paint**

Apply and maintain temporary pavement markings consisting of painted pavement markings at the locations shown. The painted temporary pavement marking must be complete in place at the location shown before opening the traveled way to traffic. Apply 1 or 2 coats of temporary pavement marking paint for new or existing pavement.

#### **12- 8.03H Temporary Pavement Markers**

Place temporary pavement markers under the manufacturer's instructions. Cement the markers to the surfacing with the manufacturer's recommended adhesive, except do not use epoxy adhesive in areas where removal of the pavement markers is required.

You may use retroreflective pavement markers specified in section 85 instead of temporary pavement markers for long term day/night use, 180 days or less, except to simulate patterns of broken traffic stripe. Retroreflective pavement markers used for temporary pavement markers must comply with section 85, except the waiting period before placing pavement markers on new HMA surfacing as specified in section 85-1.03 does not apply. Do not use epoxy adhesive to place pavement markers in areas where removal of the pavement markers is required.

Temporary pavement markers must be complete in place before opening the traveled way to traffic.

#### **12-8.04 PAYMENT**

Not Used

AA

### 13 WATER POLLUTION CONTROL

**Add to section 13-1.01A:**

The San Francisco Bay Region (2) RWQCB will review the authorized SWPPP.

**Add to section 13-3.01A:**

The project is risk level 2.

**Replace the 4th paragraph in section 13-3.01A with**

Discharges of stormwater from the project must comply with the permit issued by the RWQCB for *National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, NPDES No. CAS000002*. The RWQCB general permit governs stormwater discharges resulting from construction activities in the project area.

**Add to section 13-6.03H:**

Temporary reinforced silt fence must be Type 1.

**Replace section 13-11 with:**

#### 13-11 WATER QUALITY MONITORING

##### 13-11.01 GENERAL

Section 13-11 includes specifications for monitoring water quality during the following construction activities:

1. From installation of Temporary Storm Water Run-on Bypass and Dewatering System until removal of Temporary Storm Water Run-on Bypass System and Dewatering System
2. Discharging water from initial dewatering to remove water from cofferdam interior prior to starting construction
3. Discharging water from cofferdams when deflating cofferdams at completion of the construction

The receiving water for this project is Suisun Bay Estuaries.

##### 13-11.02 WATER QUALITY MONITOR

###### 13-11.02A General

Assign a water quality monitor (WQM) to collect water samples and record water quality data. The WQM must be responsible for generating and submitting water quality reports.

Within 7 days after Contract approval, submit the WQM qualifications including training and experience in collecting and analyzing water quality samples.

The WQM must have the same qualifications as the WPC manager including the requirements for QSP and must have training and experience in collecting and analyzing water quality samples. The WQM may be the same person as the WPC manager.

If other personnel will be collecting water quality samples, their training must include:

1. SAP review
2. Health and safety review
3. Sampling simulations

If there is an unauthorized discharge, the WQM must immediately notify the Engineer within 6 hours.

### 13-11.02B Visual Inspections

The WQM must perform a visual inspection after each:

1. Storm event
2. Nonstormwater discharge as follows:
  - 2.1. Observe receiving waters:
    - 2.1.1. 24 hours before beginning in-water work including the installation of clear water diversions
    - 2.1.2. At least 4 times daily during in-water work activities including the installation, operation, and removal of clear water diversions
  - 2.2. Observe receiving waters for the presence of floating and suspended materials, sheen on the surface, discoloration, turbidity, odors, and sources of observed pollutants
  - 2.3. Observe the job site for the presence of authorized and unauthorized nonstormwater discharges and their sources. Unauthorized discharges to surface waters include:
    - 2.3.1. Soil, silt, and sand
    - 2.3.2. Bark, sawdust, and slash
    - 2.3.3. Rubbish and debris
    - 2.3.4. Cement, concrete, and concrete washings
    - 2.3.5. Oil and petroleum products
    - 2.3.6. Welding slag
    - 2.3.7. Other organic or earthen materials

The WQM must prepare a visual inspection report for each storm event and nonstormwater discharge. Each visual inspection report must include:

1. Name of personnel performing the inspection, inspection date, and date the inspection report is completed
2. Storm and weather conditions
3. Locations and observations
4. Corrective actions taken

Retain visual inspection reports at the job site.

### 13-11.03 WATER QUALITY SAMPLING AND ANALYSIS DAY

Water quality sampling and analysis day includes activities such as preparation, collection, analysis, and reporting of water quality samples.

This project is subject the water quality objectives (WQO) shown in the following table:

Water Quality Objectives				
Parameter	Test Method	Detection limit (min)	Units	WQO
Turbidity (during activities for in-water work)	Field test with calibrated portable instrument (Measured at downstream sampling location)	1	NTU	Must not exceed 10 percent above natural background in areas where natural turbidity is greater than 50 NTU
pH	Field test with calibrated portable instrument (Measured at downstream sampling location)	0.2	pH	Lower WQO = 6.5 Upper WQO = 8.5 And any change greater than 0.5 units from natural background
Temperature	Field test with calibrated portable instrument	0.1	°F	Must not be increased 5 degrees above natural background

Perform water quality sampling whenever a project activity, conducted within waters of the State, has the potential to mobilize sediment or alter background conditions within waters of the State. Perform surface water quality sampling when:

1. Conducting in-water work
2. Work activities result in materials reaching receiving waters
3. Work activities result in the creation of a visible plume in receiving waters

Comply with the equipment manufacturer's recommendation for sample collection, analysis methods, and equipment calibration.

At least 24 hours before starting in-water work:

1. Establish locations for water quality sampling:
  - 1.1. Upstream of the effluent discharge point or location of in-water work by no more than 50 feet.
  - 1.2. Effluent discharge point including location of in-water work.
  - 1.3. Downstream of the effluent discharge point or location of in-water work between 35 and 50 feet.
2. Conduct water quality sampling to document background conditions for upstream, effluent, and downstream locations. Sample for each WQO shown in the table titled "Water Quality Objectives."
3. Estimate water flow.

Whenever conducting in-water work including the installation of a clear water diversion, conduct water quality sampling:

1. At least 4 times daily for each water quality objective
2. At upstream, effluent, and downstream locations

If sample results exceed a WQO, immediately notify the Engineer within 30 minutes and:

1. Conduct water quality sampling every hour until measurements comply with WQOs
2. Measure the distance from the effluent location to the downstream extent of the exceedance
3. Obtain photos of the tributary upstream, downstream, and at the location of in-water work
4. If BMPs are installed, repaired, or modified to control the source of the exceedance, monitor the activity and document with samples, photos, and a brief summary

You are not required to physically collect samples under the following conditions:

1. During dangerous weather conditions such as flooding or electrical storms
2. Outside of normal working hours

If downstream samples show levels outside of the acceptable range and indicate a possible WQO exceedance, assess WPC practices, site conditions, and surrounding influences to determine the probable cause for the increase.

Retain calibration logs, water quality sampling documentation, and analytical results at the job site.

#### **13-11.04 WATER QUALITY MONITORING REPORT**

##### **13-11.04A General**

Submit a monthly water quality monitoring report by the 7th of the month for monitoring work conducted during the previous month. The report must include:

1. Visual inspection reports
2. If in-water work was done, the following field sampling results and inspections:
  - 2.1. Analytical methods, reporting units, and detection limits
  - 2.2. Date, location, time of sampling, visual observation, photos, and measurements
  - 2.3. Estimate of water flow
  - 2.4. Calibration logs for field monitoring equipment
3. If a storm event generates visible runoff, include visual inspections and sampling results with:
  - 3.1. Date, location, and time of visual observation
  - 3.2. Photos of areas disturbed by project activities including excess materials disposal areas

- 3.3. Photos showing disturbed soil areas and documenting compliance for erosion control and revegetation measures including soil stabilization and sediment control BMPs
4. Summary of exceedance
5. Summary of corrective actions

**13-11.04B Water Quality Objective Exceedance Report**

If a WQO is exceeded, the WQM must:

1. Notify the Engineer by phone or electronic media within 30 minutes after WQO is exceeded
2. Submit a WQO exceedance report within 6 hours after WQO is exceeded

The report must include:

1. Field sampling results and inspections including:
  - 1.1. Analytical methods, reporting units, and detection limits
  - 1.2. Date, location, time of sampling, visual observation, photos, and measurements
  - 1.3. Estimate of water flow
2. Description of BMPs and corrective actions taken to manage WQO exceedance

**13-11.04C Additional Reports**

Not Used

**13-11.05 WATER QUALITY ANNUAL REPORT**

Not Used

**Replace section 13-12 with**

**13-12. TEMPORARY STORM WATER RUN-ON BYPASS AND DEWATERING SYSTEM**

**13-12.01 GENERAL**

**13-12.01A Summary**

Section 13-12 includes specifications for designing, installing, implementing, monitoring, maintaining, and removing Temporary Storm Water Run-on Bypass and Dewatering System (TSWRBDS) consisting of 2 subsystems:

1. Temporary Storm Water Run-on Bypass System (TSWRW) to bypass storm water and to prevent run-on and tidal flows from entering work areas
2. Temporary Dewatering System to dewater the work areas to provide a dry working environment

Comply with the laws, regulations, and Permits, Licenses, Agreements, and Certifications (PLACs).

Do not start construction until a Temporary Storm Water Run-on Bypass Plan and Temporary Dewatering Plan are authorized by the Engineer upon RWQCB acceptance.

**13-12.01B Available Information**

A Water Quality Information Handout is specified in section 2-1.06B. The Information handout includes:

1. Storm Water Information
2. Non-Storm Water Information
  - 2.1. Anticipated groundwater seepage rates in the project area.
  - 2.2. RWQCB General Waste Discharge Requirements for Order No. R2-2012-0012, NPDES General Permit No. CAG912002, referred to as Order R2-2012-0012 thereafter
  - 2.3. Local Publicly Owned Treatment Work (POTW) facility information
  - 2.4. Relevant portion of Site Investigation Report

**13-12.02 TEMPORARY STORM WATER RUN-ON BYPASS (TSWRB)**

**13-12.02A General**

The TSWRB includes of a system of structures and measures that intercept tidal flows and storm water run-on discharges upstream of work area, transport it around the work area, and discharge it downstream with minimal water quality degradation from all construction activities.

Bypass storm water run-on discharges and tidal flows to prevent run-on and tidal flow from entering work areas. The TSWRB must include at a minimum:

1. Temporary water-filled cofferdams in combination with temporary gravel-filled bag cofferdams or plywood cofferdams with impermeable plastic liner around the work areas to form a watertight enclosure to prevent storm water run-on and tidal flows from entering to the work areas.
2. Temporary pumps to remove excess standing water from work areas.
3. Corrugated metal pipe enclosures along the perimeter of the CIDH pile excavations and CISS pile excavations and at abutment 12 to prevent any excess standing water coming in contact with groundwater in the excavations as necessary.
4. Temporary water-filled cofferdam on the west side of the utility culvert under the I-680 southbound on- and off-ramps to prevent storm water run-on from entering the work area.
5. Temporary plastic pipes to connect the deck drains under the Mococo overhead and outfall to the channel outside of the cofferdam enclosure.

### **13-12.02A(1) Submittals**

#### **13-12.02A(1)(a) General**

Use of an alternative TSWRB is acceptable if approved by the Engineer. The alternative TSWRB must be within the temporary impact area allowed in the PLACs in the Water Quality Information Handout. The alternative TSWRB is subject to the same submittal, review, and approval process as required for the TSWRB as specified in section 13-12.02A(1). The Department does not pay any increase in cost for the alternative TSWRB. The alternative TSWRB must be installed and maintained as required for the TSWRB specified.

#### **13-12.01A(1)(b) Temporary Storm Water Run-on Bypass Plan (TSWRBP)**

Submit a TSWRB plan at least 55 days prior to beginning of TSWRB work. TSWRB plan must include:

1. Title sheet
2. Table of contents
3. Certification and approval sheet described in the Department's *Storm Water Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual*
4. Amendment log and format described in the Department's *Storm Water Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual*
5. Description and schedule of temporary storm water run-on bypass activities
6. Description of:
  - 6.1. All major sources of storm water run-on discharges and tidal flows entering the work areas
  - 6.2. Measures to bypass run-on and prevent run-on from entering into work areas
  - 6.3. Measures to prevent tidal flows from entering into work areas
7. TSWRB description, including:
  - 7.1. Components of TSWRBP
  - 7.2. Calculations to size the collection and conveyance aspects of the system including pipes, pumps, etc
8. Installation and removal process of TSWRB System, including:
  - 8.1. Equipment to be used in implementing manufacturer's specifications
  - 8.2. Equipment platforms, if applicable
  - 8.3. Access locations detailing stabilization and maintenance controls
9. Inspection and maintenance procedures of TSWRB System
10. Shop drawings showing:
  - 10.1. Plan and section views of TSWRB System
  - 10.2. Location and description of sampling points for water quality measurements
  - 10.3. Flow patterns of all major run-ons entering the work areas
  - 10.4. Measures to bypass run-on and prevent run-on from entering work areas
11. Specifications of materials and equipment including pumping system
12. Restoration plans for the areas affected by TSWRB. Restoration plan must include:
  - 12.1. Description of existing conditions of the areas, including
    - 12.1.1. Soil type
    - 12.1.2. Slope
    - 12.1.3. Vegetation
    - 12.1.4. Special features, if applicable

- 12.2. Printed and digital time-date stamped photos of pre-existing conditions of the areas
- 12.3. DVD-video disc containing video of pre-existing conditions of the areas
- 12.4. Methods for preservation or restoration of the areas
- 13. Monitoring, sampling, and reporting plan for water quality control including but not limited to methods of analysis, frequency of sampling and analysis, types of equipment used, and the like.
- 14. Schedule of work including best management practice (BMP) implementation
- 15. Description of aquatic and animal life protection measures such as protective screens, barrier controls, and the like.

The approval process for TSWRB Plan is:

- 1. Submit 3 copies of the TSWRB plan. Allow 10 days for review. The Engineer provides comments and specifies the date that the review stopped, if revisions are required.
- 2. Change and resubmit a revised TSWRB plan within 5 days of receipt of the Engineer's comments. The Engineer's review resumes when a complete TSWRB plan is resubmitted.
- 3. When the Engineer authorizes the TSWRB plan, submit an electronic copy and 4 printed copies of the authorized TSWRB plan within 24 hours.
- 4. Allow 30 days for the Engineer to submit the authorized TSWRB plan to the RWQCB.
- 5. If the Engineer requests changes to the TSWRB plan based on the RWQCB's comments, amend the TSWRB plan within 5 days.
- 6. Submit TSWRB as Attachment "F", under "Other Plans, Permits, and Agreements" in SWPPP Amendment.
- 7. Upon authorization and implementation of the TSWRB, if it is determined that the TSWRB System is inadequate, adjustments must be made at no additional cost to the Department including revisions to the TSWRB.

After completion of TSWRB removal and restoration of the areas affected by TSWRB, submit:

- 1. Printed and digital time-date stamped photos of post-construction conditions for the areas in comparison to the original conditions
- 2. DVD-video disc containing video of post-construction conditions for the areas in comparison to the original conditions

### **13-12.02B Materials**

#### **13-12.02B(1) General**

Use the materials, equipment, accessories, and incidentals that are non-toxic and non-hazardous.

#### **12.02B(2) Water-filled Cofferdam**

The water-filled cofferdam must:

- 1. Be able to stand alone without additional external stabilization devices.
- 2. Not degrade the aquatic environment by siltation or other means or harm native wildlife.
- 3. Be as watertight as practicable to provide a reasonably dry working area suitable for construction activities.
- 4. Consist of a system of at least 1 pair of water-filled inner tubes in a side-by-side position contained by 1 outer tube that forms a stable, non-rolling wall of water. The inner tube fabric must be impervious. The outer tube fabric must be UV and puncture resistant.
- 5. Have threaded fill ports and drain ports for each cofferdam unit for rapid inflation and draining.
- 6. Have end-lifting loops used for equipment to control the dam during its installation and removal.

#### **13-12.02B(3) Pumps**

Pumps must comply with section 13-12.03B(2).

#### **13-12.02B(4) Plastic Pipe**

Plastic pipe must comply with section 64-1.02C and:

- 1. Be clean, uncoated, in good condition, and free of paint, oil, dirt, or other residues that could potentially contribute to water pollution
- 2. Be adequately supported for planned loads
- 3. Use watertight joints

4. Be made of a material or combination of materials that are suitable for clean water and which do not contain banned, hazardous, or unlawful substances
5. Be visually inspected on a daily basis during use with written recording of inspection

#### **13-12.02B(5) Corrugated Metal Pipe**

Corrugated metal pile must comply with section 66. Corrugated metal pipe must be large enough to provide clearance to perform the CIDH pile work and CISS pile excavations at abutment 12.

#### **13-12.02B(6) Gravel-Filled Bags**

Gravel-filled bags must comply with section 13-5.02G.

#### **13-12.02B(7) Impermeable Plastic Linear**

Impermeable plastic liner must be:

1. Single ply, commercial quality, non-photodegradable polyethylene with a minimum thickness of 10 mils under ASTM D 5199
2. Free of holes, punctures, tears or other defects that compromise the impermeability of the material
3. Suitable for use as an impermeable membrane

#### **13-12.02B(8) Plywood**

Plywood must be at least 3/4 inch thick structural plywood manufactured with:

1. Plies glued perpendicular to each other
2. Knots removed and repaired
3. Adhesives for wet use

Chipboard is not allowed. Plywood must be secured to structures such as trestle to withstand tidal influence.

### **13-12.02C Construction**

#### **13-12.02C(1) General**

Do not use motorized vehicles and equipment in areas of flowing and standing water for the construction and removal of the TSWRB System. Remove vegetation to ground level and dispose of debris. Place temporary or permanent fill as allowed by PLACs. Do not initiate installation if the National Weather Service predicts at least a 50 percent probability of precipitation within 72 hours.

Monitor the National Weather Service's forecast on a daily basis. For the National Weather Service's forecast, go to the Web site for the National Weather Service.

Stop all work and remove or stabilize all pollutant sources if the 72-hour forecasts predict a 50 percent or greater chance of rain in the project area and the predicted rainfall is estimated to produce a flow exceeding the design capacity of the TSWRB.

The TSWRB System must be constructed within the temporary impact area allowed in the PLACs.

Control turbidity to greatest extent practicable during installation and removal of the TSWRB System.

Comply with the manufacturer's instructions for the water-filled cofferdam's installation and for dewatering the work area. Overlap individual cofferdam units at each end to produce a watertight connection under the manufacturer's instructions except you may use another type of connection if you demonstrate to the Engineer that it is watertight.

During installation of cofferdams, attach a floating device to the suction end of pump intake to draw off the top water.

When deflating water-filled cofferdams at completion of the construction, direct water from cofferdam inner tubes to a vegetated area and release slowly and gently through a discharge pit as shown on plans if water quality objectives defined in section 13-11.03 are met.

Comply with section 13-11 to conduct water quality sampling during discharging of the water from cofferdam inner tubes. If water quality objectives in section 13-11.03 are not met, adjust BMPs to bring

water quality objectives under limitation, or dispose properly to a POTW system as specified in section 13-12.03C(2) at no additional cost to the Department. You are responsible for additional requirements if ordered by RWQCB or other applicable agencies.

Prior to starting any construction activities, except installation of cofferdams, perform initial dewatering to remove water from interior of the cofferdam. Direct water from initial dewatering to a vegetated area and release slowly and gently through a discharge pit as shown on the plans if water quality objectives are met.

Comply with section 13-11 to conduct water quality sampling during discharging of the water from initial dewatering. If water quality objectives in section 13-11.03 are not met, adjust BMPs to bring water quality objectives under limitation, or dispose to a POTW system at no additional cost to the Department. You are responsible for additional requirements if ordered by RWQCB or other applicable agencies.

After cofferdam construction, remove all water accumulating inside cofferdam and convey to the dewatering system for treatment and disposal under section 13-12.03.

Prevent any leakage in the TSWRB System that interferes with the work. Dewater, treat, and discharge any storm water or tidal flow leaking into the work areas under section 13-12.03. Do not allow storm water run-on or tidal flow being bypassed to mix with groundwater.

If it becomes necessary to reposition the TSWRB during the progress of the work, reposition it as necessary, at no additional cost to the Department.

#### **13-12.02C(2) Inspection and Maintenance**

Inspect the TSWRB System at least every 4 hours during operation to ensure that all components are functional. Maintain the TSWRB System to provide complete enclosure of the work area and to prevent leakage. Maintain the TSWRB to provide adequate holding capacity with a minimum freeboard of 12 inches between the water surface and the top of the cofferdam. Repair or replace the TSWRB System immediately after the damage occurs. The Department does not pay for the repair or replacement for the damage to the TSWRB System resulting from your vehicles, equipment, or operations. If any component of TSWRB System is damaged so that the performance of TSWRB System is diminished below allowable water quality objectives, stop the TSWRB System operation until damaged component is replaced or repaired.

#### **13-12.02C(3) Removal**

Remove and dispose of all components of TSWRB System upon completion of work.

Repair depressions and other ground disturbances caused by the removal of the TSWRB System. Restore ground to pre-existing conditions. Clean and treat cofferdams to remove all contaminants before reuse, or dispose properly.

#### **13-12.02D Payment**

Not Used

### **13-12.03 TEMPORARY DEWATERING SYSTEM**

#### **13-12.03A General**

##### **13-12.03A(1) Summary**

Temporary dewatering operations consist of collection, conveyance, treatment, and disposal of contaminated groundwater including water resulting from piling work, comingled with storm water, and storm water removed from the work areas. The temporary dewatering system is referred to as dewatering system.

Discharge treated water to surface water or land under San Francisco Bay Regional Water Quality Control Board General NPDES Permits for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds, Fuel Leaks and Other Related Wastes (*Order No. R2-2012-0012, NPDES No. CAG912002*)

### **13-12.03A(2) Submittals**

#### **13-12.03A(2)(a) Dewatering and Discharge Plan (DDP)**

Submit the DDP plan at least 55 days prior to discharge activities:

1. Submit 3 copies of your DDP for review. Allow 10 days for the Engineer's review. The Engineer provides comments and specifies the date when the review stopped if revisions are required.
2. Change and resubmit a revised DDP within 5 days of receiving the Engineer's comments. The Engineer's review resumes when a complete DDP has been resubmitted.
3. When the Engineer authorizes the DPP, submit an electronic copy and 4 printed copies of the authorized DDP within 24 hours.
4. Allow 30 days for the Engineer to submit the authorized DDP to the RWQCB.
5. If the Engineer requests changes to the DDP based on the RWQCB's comments, amend the DDP within 5 days.
6. Upon authorization and implementation of the DDP, if it is determined that the dewatering system is inadequate, make adjustments must be made at no additional cost to the Department including revisions to the DDP.

The DDP must include:

1. Title sheet.
2. Table of contents.
3. Certification and approval sheet described in the Department's *Storm Water Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual*.
4. Amendment log and format described in the Department's *Storm Water Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual*.
5. Description and schedule of the dewatering and discharge activities.
6. Discharge alternatives, including:
  - 6.1. Dust control
  - 6.2. Percolation
  - 6.3. Storm sewers
  - 6.4. Surface waters
7. Treatment system description and components.
8. Design report certifying the adequacy of each component of the treatment system in conformance with Order No. R2-2012-0012 and these special provisions. The report must be sealed and signed by an engineer registered as a civil engineer in the State.
9. Anticipated flow rates.
10. Operation and maintenance manual for equipment covering all aspects of the treatment system.
11. Monitoring, sampling, and reporting plan, including quality assurance and quality control.
12. Health and safety plan.
13. Spill prevention plan.
14. Field-recorded data, visual inspection, calibration procedures, and examples of logs.
15. Measuring equipment descriptions.
16. Description of the method for discharging treated water or uncontaminated ground or surface water.
17. Shop drawings showing:
  - 17.1. Section and plan views of effluent treatment systems
  - 17.2. Location of sampling points for water quality measurements
  - 17.3. Flow path and placement of pipes, hoses, pumps, holding tanks, and other equipment used to convey water
  - 17.4. General position of treatment components relative to excavations or other areas requiring dewatering
  - 17.5. Point of discharge
18. Daily inspection report (DIR). The daily inspection report must include:
  - 18.1. Discharge volumes daily and accumulative
  - 18.2. Water quality monitoring records
  - 18.3. Discharge point information that includes:
    - 18.3.1. Date and time
    - 18.3.2. Weather conditions, including wind direction and velocity
    - 18.3.3. Presence or absence of water fowl or aquatic wildlife
    - 18.3.4. Color and clarity of the effluent discharge

- 18.3.5. Erosion or ponding downstream of the discharge site
- 18.3.6. Photographs labeled with the time, date, and location
- 19. Municipal batch discharge permit from a publicly owned treatment works if required.
- 20. Coagulant pollution prevention plan (CPPP) with the DDP. If chemical coagulants, in-line flocculants, or both are used, in the treatment system, chemical coagulants and flocculants proposed for use in CPPP must comply with Attachment F Provisions D and E, in *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002 )* refer as Order 2009-0009 thereafter. The Coagulant Pollution Prevention Plan (CPPP) must include:
  - 20.1. Description of BMPs to prevent accidental spillage, overfeeding into the treatment system, or other mishandling of coagulant agents
  - 20.2. Monitoring plan for all coagulants, flocculants, or both that complies with Attachment F in Order 2009-0009.
  - 20.3. Description of the agents, including chemical and trade names
  - 20.4. Determination of acute and chronic toxicity for aquatic organisms conforming to EPA methods for the agents
  - 20.5. Monitoring plan to detect a residual agent at concentrations at or below established acute toxicity levels for freshwater and marine conditions for that agent
- 21. Completed Notice of Intent as specified in Attachment B of Order No. R2-2012-0012.
- 22. All fees assessed by RWQCB in connection with the discharge under Order No. R2-2012-0012.

**13-12.03A(2)(b) Notice of Discharge Report**

Whenever observations or measurements confirm that a residual chemical or water quality standard is exceeded:

1. Submit the notice of discharge report within 48 hours after exceeding the limits
2. Document the reasons for exceeding the water quality standard and any corrective work performed to prevent a recurrence in the notice of discharge
3. Comply with all applicable provisions in Order No. R2-2012-0012 regarding, bypass, upset, and the like.

**13-12.03A(2)(c) Startup Report**

Submit a start-up report and letter of transmittal as required in Order No. R2-2012-0012 to the Engineer no later than 5 days after the end of the start-up phase.

**13-12.03A(2)(d) Self Monitoring Report**

Submit a Self-Monitoring Report and letter of transmittal as required in Order No. R2-2012-0012 to the Engineer no later than 25 days after the last day of the month.

**13-12.03A(2)(e) Other Treatment System Submittals**

If the system discharges treated effluent, submit a DIR within 24 hours.

Submit records of delivery and removal of system components.

**13-12.03A(3) Quality Control and Assurance**

A residual chemical for coagulants must be less than 10 percent of the maximum allowable threshold concentration for the most sensitive species.

Discharges must comply with Order R2-2012-0012 and other applicable permits.

**13-12.03B Materials**

**13-12.03B(1) General**

Design and implement a system for the site conditions and anticipated flow rate to achieve and maintain compliance with receiving water limitations and discharge effluent limitations. System must include but not limited to:

1. Collection and conveyance system
2. Temporary holding tanks
3. Treatment system

4. Sampling, monitoring, and recordkeeping methods
5. Discharge methods

#### **13-12.03B(2) Collection and Conveyance System**

Provide pumps and piping to convey the water from the point of dewatering or non stormwater capture to the treatment system and to the point of discharge. Pumps and piping must comply with section 74-2.

Pumps must:

1. Be equipped with second containment and designed to prevent gross intake of silt, sediment, debris, and the like.
2. Be free of fuel and oil leaks
3. Include intake screens that meet regulatory requirements

Use a flow meter approved by the Engineer to measure all discharges from treatment activities.

#### **13-12.03B(3) Temporary Holding Tanks**

Store water pumped during dewatering activities in temporary holding tanks placed at the work area for treatment to remove sediment.

Use temporary holding tanks including transportable closed-top holding tanks or tanker trucks. Provide a sufficient number of holding tanks based on:

1. Anticipated flow rate
2. Pumping rates
3. Capacity inefficiencies due to sediment retention within the holding tanks
4. Sediment settling rates
5. Sediment removal frequency
6. Anticipated water loss or reuse rates

Temporary holding tanks must have holding capacity sufficient to handle the water removed from dewatering activities, and to prevent delay of work.

Each temporary holding tank must have an inlet and outlet capable of receiving and discharging flows at a sufficient rate to handle the water removed from dewatering activities.

Maintain a minimum freeboard of 1 foot in each of the temporary holding tanks at all times. Clean the holding tanks when 25 percent of the tank's volume is filled with sediment.

#### **13-12.03B(4) Treatment Systems**

Primary and secondary treatment may be required, or the design of the system may require combined use of the various treatment components in series to achieve effective treatment and maintain compliance with receiving water limitations and discharge effluent limitations set forth by Order No. R2-2012-0012, or provide treatment to achieve compliance with receiving water limitations and discharge effluent limitations set forth by a POTW or an off-site licensed disposal facility. System must have components to:

1. Remove sediment, turbidity-producing suspended solids, and other constituents that are encountered during work operations in addition to what is identified in the groundwater that are listed in "Subsurface Investigation Report, Macoco Overhead Seismic Restoration Project, Martinez, California, December 2007". Treatment components may include desilting basins, weir tanks, settling tanks, sediment traps, gravity bag filters, sand media filters, pressurized bag filters, cartridge filters, in-line chemical coagulants and flocculants, activated clay filters, activated carbon filters, enhanced oil/water separators, natural or synthetic media filters, or any combination necessary to provide primary and secondary treatment. Steam clean the treatment system components prior to installation and demobilization to remove any residual contaminants. The treatment system must have appropriate fittings for pipe connections designed to accommodate the required flow rate.

2. Adjust pH or dissolved oxygen and include:
  - 2.1. Addition of sulfuric, phosphoric, citric, or nitric acid under the supplier's specifications and by the RWQCB. You are fully and solely responsible for securing approval from the RWQCB. Submit written approval from the RWQCB to the Engineer for review before any use for treatment of water with high pH. You may use hydrochloric acid if the water is dechlorinated before discharge.
  - 2.2. Filtration through a limestone bed or addition of sodium hydroxide for treatment of water with a low pH. You may use carbon dioxide diffusion that produces carbonic acid for pH adjustment.
  - 2.3. Aeration for treatment of water with low dissolved oxygen.

### **13-12.03B(5) Discharge Methods**

Provide a method for discharging treated water and include a discharge location. Do not discharge treated water in a way that impacts the natural bedding and aquatic life.

Discharge treated water:

1. To control dust in active work areas.
2. To land where the grade does not allow sheet flow and the soil allows infiltration.
3. In a way that does not cause erosion and scour by installation of a discharging pit as shown. If scour occurs, repair the damage immediately and up-grade the discharging pit.

### **13-12.03C Construction**

#### **13-12.03C(1) General**

Water quality must comply with limits for discharge effluents and the receiving waters. Whenever observations or measurements under section 13-12.03C determine the water quality limits are exceeded:

1. Stop the discharge immediately
2. Notify the Engineer within 30 minutes
3. Start corrective measures to change, repair, or replace the equipment and procedures used to treat the water
4. Submit the notice of discharge report under section 13-12.03A(2)(b) within 48 hours

After the Engineer inspects and authorizes your corrective measures, resume treatment and discharge activities under the startup-phase sampling requirements before resuming regular-phase sampling.

Maintain the system to provide required function and prevent leaks. Whenever a component of the system is not functioning properly, discontinue treatment activities and repair or replace the component.

Relocate the system as needed.

#### **13-12.03C(2) Monitoring**

Comply with the manufacturer's instructions for all calibrations of the flow meter. Perform calibrations in the presence of the Engineer.

While the system is in operation, monitor in conformance with the Monitoring and Reporting Program included in Attachment E of the Order R2-2012-0012 for discharging treated water.

You may discharge into a publicly owned treatment works (POTW) system instead of using a dewatering system. If contaminated groundwater, storm water, or both are discharged to a POTW, obtain a municipal batch discharge permit. You are responsible for all costs and requirements related to obtaining the municipal batch discharge permit and discharging the water.

#### **13-12.03C(3) Inspection and Maintenance**

Conduct a daily inspection of the dewatering system, when in use, and ensure that all components are functional and routinely maintained to prevent leakage before removal of suspended solids and other contaminants. If any component of the equipment is damaged so that the performance of the equipment is diminished below allowable operational levels, discontinue the dewatering operation and repair or replace the component with substitute component. Record Inspections in writing.



**14-6.02B Material**

Not Used

**14-6.02C Construction**

**14-6.02C(1) General**

Not Used

**14-6.02C(2) Protective Radius**

Upon discovery of a regulated species, stop construction activities within a 100 foot radius of the discovery or as defined in the table below. Immediately notify the Engineer. Do not resume activities until receiving notification from the Engineer.

Regulated species name	Protective radius
California clapper rail ( <i>Rallus longirostris obsoletus</i> )	700 feet for any work and 1,500 feet for pile driving activities.
All raptors (e.g., hawks, owls, eagles.)	300 feet
All migratory and nongame birds	50 feet

**14-6.02C(3) Protocols**

Use protocols required by PLACs or, if not specified, use as shown in the following table:

Regulated species name	Protocol
California Clapper rail ( <i>Rallus longirostris obsoletus</i> )	If active nests, nests with egg(s) or young present, broods, or calling centers are located in the action area, all construction activities within the survey buffer must cease immediately and notify the Engineer within 24 hours of the observation. No work within 700 feet and no pile driving are allowed within 1,500 feet of the active nest(s), broods and calling centers until the young have fledged.

**14-6.02C(4) Biological Resource Information**

Reserved

**14-6.02C(5) Protection Measures**

Within Species Protection Area, implement the following protection measures:

- 1. Bird nest protection and removal:
  - 1.1. Vegetation removal and weep hole exclusion shall not occur during the breeding season of February 1 through September 1.
  - 1.2. Comply with PLACs.
  - 1.3. You must cooperate with the biological monitors designated by Caltrans.
  - 1.4. Movement of heavy equipment to and from the project site must be limited to established roadways.
  - 1.5. Speed limit of all construction vehicles is 20 mph with the project limits.
  - 1.6. Use exclusion techniques, approved by the Engineer, to prevent migratory birds from nesting on the ground, in trees, shrubs, or other vegetation within the ESA limits. Exclusion techniques may include, but are not limited to; tree removal and clearing and grubbing areas required by the contract.
  - 1.7. Remove all nests and prevent birds from nesting on existing, permanent and temporary structures during construction, outside the anticipated bird breeding season of February 1 through September 1.
  - 1.8. Prevent birds from nesting by installing heavy delta knotless netting, 1/2-inch square mesh, or alternative exclusion devices approved by the Engineer.
  - 1.9. Every other day, inspect exclusion devices and check for any signs of nesting. Maintain, repair and replace the devices to correct any problem discovered within 24 hours. Remove unoccupied new or partially built nests. Keep a written inspection record of time, date, condition, and any action taken.
  - 1.10. If an occupied nest is discovered on any structure, stop the work within the protective radius immediately and notify the Engineer. Do not disturb birds or nests occupied by birds, hatchlings or eggs. Do not resume work until directed in writing by the Engineer.
  - 1.11. When directed by the Engineer, remove and dispose of all exclusion devices in conformance with the provisions in Section 7-1.13, "Disposal of Material outside the Highway Right of Way," of the Standard Specifications.
  - 1.12. Submit a copy of the inspection records of nesting removal and prevention for the previous week to the Engineer no later than following Tuesday.
  - 1.13. If evidence of bird nesting is discovered or when a bird is injured or killed as a result of construction activity, immediately stop work within 50 feet of the nest, or as specified under "Protective Radius" in section 14-6.02C(2), and notify the Engineer. Do not resume work until the Engineer provides written notification that work may resume at that location. Further work, actions, or remediation may be prescribed by the Engineer and may include work exclusion zones, modified schedules, or other methods based on the species involved.

**14-6.02C(6) Monitoring Schedule**

Not Used

**14-6.02D Payment**

Not Used

**Replace item 1 in the list in the 7th paragraph of section 14-6.03A with:**

- 1. Stop all work within a 100-foot radius of the discovery except as shown in the following table:

**Radius Exceptions**

Species	Work stoppage radius (feet)
Raptors	500

**Replace section 14-11.07 with:**

**14-11.07 REMOVE YELLOW TRAFFIC STRIPE AND PAVEMENT MARKING WITH HAZARDOUS WASTE RESIDUE**

**14-11.07A General**

**14-11.07A(1) Summary**

Section 14-11.07 includes specifications for removing existing yellow thermoplastic and yellow painted traffic stripe and pavement marking. The residue from the removal of this material is a Department-generated hazardous waste.

Residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking contains lead chromate. The average lead concentration is at least 1,000 mg/kg total lead or 5 mg/l soluble lead. When applied to the roadway, the yellow thermoplastic and yellow painted traffic stripe and pavement marking contained as much as 2.6 percent lead. Residue produced from the removal of this yellow thermoplastic and yellow painted traffic stripe and pavement marking contains heavy metals in concentrations that exceed thresholds established by the Health & Safety Code and 22 CA Code of Regs. For bidding purposes, assume the residue is not regulated under the Federal Resource Conservation and Recovery Act (RCRA), 42 USC § 6901 et seq.

Work associated with disposal of hazardous waste residue regulated under RCRA as determined by test results is change order work.

Yellow thermoplastic and yellow paint may produce toxic fumes when heated.

**14-11.07A(2) Submittals**

**14-11.07A(2)(a) General**

Reserved

**14-11.07A(2)(b) Lead Compliance Plan**

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

**14-11.07A(2)(c) Work Plan**

Submit a work plan for the removal, containment, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The work plan must include:

1. Objective of the operation
2. Removal equipment
3. Procedures for removal and collection of yellow thermoplastic and yellow painted traffic stripe and pavement marking residue, including dust
4. Type of hazardous waste storage containers
5. Container storage location and how it will be secured
6. Hazardous waste sampling protocol and QA/QC requirements and procedures
7. Qualifications of sampling personnel
8. Analytical lab that will perform the analyses
9. DTSC registration certificate and CA Highway Patrol (CHP) Biennial Inspection of Terminals (BIT) Program compliance documentation of the hazardous waste hauler that will transport the hazardous waste
10. Disposal site that will accept the hazardous waste residue

The Engineer will review the work plan within 5 business days of receipt.

Do not perform work that generates hazardous waste residue until the work plan has been authorized.

Correct any rejected work plan and resubmit a corrected work plan within 5 business days of notification by the Engineer. A new review period of 5 business days will begin from date of resubmittal.

**14-11.07A(2)(d) Analytical Test Results**

Submit analytical test results of the residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking, 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

#### **14-11.07A(2)(e) U.S. Environmental Protection Agency Identification Number Request**

Submit a request for the US EPA Generator Identification Number when the Engineer accepts analytical test results documenting that residue from removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking is a hazardous waste.

#### **14-11.07A(2)(f) Disposal Documentation**

Submit documentation of proper disposal from the receiving landfill within 5 business days of residue transport from the project.

#### **14-11.07B Materials**

Not Used

#### **14-11.07C Construction**

Where grinding or other authorized methods are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking that will produce a hazardous waste residue, immediately contain and collect the removed residue, including dust. Use a HEPA filter-equipped vacuum attachment operated concurrently with the removal operations or other equally effective approved methods for collection of the residue.

Make necessary arrangements to test the yellow thermoplastic and yellow paint hazardous waste residue as required by the disposal facility and these special provisions. Testing must include:

1. Total lead by US EPA Method 6010B
2. Total chromium by US EPA Method 6010B
3. Soluble lead by California Waste Extraction Test (CA WET)
4. Soluble chromium by CA WET
5. Soluble lead by Toxicity Characteristic Leaching Procedure (TCLP)
6. Soluble chromium by 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 US 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 removal of yellow thermoplastic and yellow painted traffic stripe and pavement marking. The analytical laboratory must be certified by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) for all analyses to be performed.

After the Engineer accepts the analytical test results, dispose of yellow thermoplastic and yellow paint hazardous waste residue at a Class 1 disposal facility located in California under the requirements of the disposal facility operator within 45 days after accumulating 220 pounds of residue and dust.

If less than 220 pounds of hazardous waste residue and dust is generated in total, dispose of it within 45 days after the start of accumulation of the residue and dust.

The Engineer will sign all manifests as the generator within 2 business days of receiving and accepting the analytical test results and receiving your request for the US EPA Generator Identification Number. Use a transporter with a current DTSC registration certificate and that is in compliance with the CHP BIT Program when transporting hazardous waste.

#### **14-11.07D Payment**

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

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. The Department does not adjust payment for this disposal.

**Replace "Reserved" in section 14-11.08 with:**

#### **14-11.08A General**

Section 14-11.08 includes specifications relating to the disturbance of existing paint systems.

The existing paint system on bridge number 28-0171L consists of lead paint. Any work that disturbs the existing paint system exposes workers to health hazards and produces:

1. Debris containing heavy metal in amounts that exceed the thresholds established in 8 CA Code of Regs and 22 CA Code of Regs. This debris is a Department-generated hazardous waste.
2. Toxic fumes when heated.

Grime and detritus already on the bridge before the start of work may also contain lead. Consider this grime and detritus part of the existing paint system. The Department is the hazardous waste generator if the Engineer accepts waste-characterization test results demonstrating that the debris is a hazardous waste.

Contain all debris produced when the existing paint system is disturbed. If containment measures are inadequate to contain and collect debris produced when the existing paint system is disturbed, stop the work and do not perform additional work until:

1. Revised debris containment and collection plan has been authorized
2. Released material has been collected and contained

Handle, store, transport, and dispose of debris produced when the existing paint system is disturbed under applicable federal, state, and local hazardous waste laws.

#### **14-11.08B Submittals**

##### **14-11.08B(1) General**

Not Used

##### **14-11.08B(2) Debris Containment and Collection Plan**

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

1. Identify materials, equipment, and methods to be used when the existing paint system is disturbed
2. Include shop drawings of:
  - 2.1. Containment systems complying with section 59-2.03B(3)
  - 2.2. Components that provide ventilation, air movement, and visibility for worker safety
3. Include the name and location of the analytical laboratory that will perform the analyses
4. Identify the hazardous waste transporter that will haul the debris and provide documentation of
  - 4.1. Current DTSC registration
  - 4.2. Compliance with the CA Highway Patrol Biennial Inspection of Terminals Program
5. Include the name and location of the disposal facility that will accept the hazardous waste

Allow 20 days for review.

If required, submit a revised debris containment and collection plan.

##### **14-11.08B(3) Lead Compliance Plan**

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

##### **14-11.08B(4) Air Monitoring Reports**

Not Used

#### **14-11.08B(5) Soil Sampling Results for Debris Containment Verification**

Not Used

#### **14-11.08B(6) Waste-Characterization Test Results**

Submit waste-characterization test results for the debris and chain of custody documentation before:

1. Requesting the Engineer's signature on the disposal facility's waste profile document
2. Requesting a generator's EPA Identification Number
3. Removing the debris from the site

#### **14-11.08B(7) Request for U.S. Environmental Protection Agency Identification Number**

Submit a request for the generator's EPA Identification Number when the Engineer accepts waste-characterization test results documenting that the debris is a hazardous waste.

#### **14-11.08B(8) Disposal Documentation**

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

#### **14-11.08C Safety and Health Provisions**

##### **14-11.08C(1) General**

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

##### **14-11.08C(2) Protective Work Clothing and Washing Facilities**

Supply clean protective work clothing for 5 Department personnel:

1. Whenever there is possible exposure to heavy metals or silica dust
2. During application of paint undercoats

Replace protective work clothing as needed.

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

Protective work clothing remains your property upon completion of the Contract.

##### **14-11.08D Work Area Monitoring**

Not Used

##### **14-11.08D(2) Air Monitoring**

Not Used

##### **14-11.08D(3) Soil Sampling for Debris Containment**

Not Used

#### **14-11.08E Debris Management**

##### **14-11.08E(1) Debris Storage**

Debris produced when the existing paint system is disturbed must not be temporarily stored on the ground. Before the end of each work shift, remove accumulated debris from the containment system. Store the debris as a hazardous waste.

##### **14-11.08E(2) Debris Waste Characterization**

Perform waste characterization testing on the debris as required by the disposal facility including:

1. Total lead by US EPA Method 6010B
2. Soluble lead by California Waste Extraction Test (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 US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) while transporting samples from the job site to the analytical laboratory. The laboratory must be certified by the CDPH's Environmental Laboratory Accreditation Program (ELAP) for all analyses to be performed.

Before performing the analyses, the laboratory must homogenize each sample. The homogenization process must not include grinding of the samples. A sample aliquot must be:

1. Obtained in an amount large enough for all analyses to be performed
2. Homogenized a 2nd time
3. Used for the total and soluble analyses after the 2nd homogenization

#### **14-11.08E(3) Debris Transport and Disposal**

##### **14-11.08E(3)(a) General**

For bidding purposes, assume the debris is a hazardous waste.

##### **14-11.08E(3)(b) Hazardous Waste Debris**

After the Engineer accepts the waste-characterization test results, dispose of the debris:

1. Within 45 days after accumulating 220 lb of debris
2. At an appropriately permitted Class I facility located in California

Make all arrangements with the operator of the disposal facility.

If less than 220 lb of hazardous waste is generated in total, dispose of it within 45 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 provides the generator's EPA Identification Number and signs all manifests as the hazardous waste generator within 2 business days of accepting the waste-characterization test results and receiving your request for the generator's EPA Identification Number.

##### **14-11.08E(3)(c) Nonhazardous Waste Debris**

If waste characterization test results demonstrate that the debris is a nonhazardous waste and the Engineer accepts the results, dispose of the debris at an appropriately permitted CA Class II or CA Class III facility or recycle it. Make all arrangements with the operator of the disposal facility and comply with the facility's requirements.

You may dispose of nonhazardous debris at a facility equipped to recycle the debris if:

1. Copper slag abrasive blended by the supplier with a calcium silicate compound is used for blast cleaning.
2. You make all arrangements with the recycling facility's operator and perform any facility-required testing of the debris.

The Department does not adjust payment for disposal of nonhazardous debris at a recycling facility.

#### **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 roadside sign and metal beam guard rail 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**

Not Used

##### **14-11.09C(2) Training**

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

1. 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 lb or more of TWW, request a generator's EPA Identification Number at least 5 business days before the 1st 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. Generator's EPA Identification Number for projects with 10,000 lb or more of TWW

The shipping record must be at least a 4-part carbon or carbonless 8-1/2-by-11-inch form to allow retention of copies by the Engineer, transporter, and disposal facility.

Dispose of TWW at an approved TWW facility. A list of currently approved TWW facilities is available at:

<http://www.dtsc.ca.gov/HazardousWaste/upload/lanfillapr11pdated1.pdf>

Dispose of TWW within:

1. 90 days of generation if stored on blocks
2. 180 days of generation if stored on a containment surface or pad
3. 1 year of generation if stored in a water-resistant container or within 90 days after the container is full, whichever is shorter
4. 1 year of generation if storing in a storage building as defined in 22 CA Code of Regs, Div. 4.5, Chp. 34, § 67386.6(a)(2)(C)

#### **14-11.09D Payment**

Not Used

**Replace section 14-11.12 with:**

#### **14-11.12 PETROLEUM-CONTAMINATED MATERIAL**

##### **14-11.12A General**

##### **14-11.12A(1) Summary**

Section 14-11.12 includes specifications for excavation and disposal of petroleum-contaminated material.

##### **14-11.12A(2) Definitions**

**petroleum-contaminated material:** Earth material containing low concentrations of petroleum hydrocarbons and constituents, including benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), di-isopropyl ether (DIPE), tertiary amyl methyl ether (TAME), tertiary butyl alcohol (TBA), and 1,2-dichloroethane (1,2-DCA). Petroleum-contaminated material contains greater than: 83 mg/kg of gasoline, 83 mg/kg of diesel, and 370 mg/kg of oil.

##### **14-11.12A(3) Site Conditions**

Portions of Subsurface Investigation Report containing soil and groundwater concentration data for petroleum hydrocarbons and constituents prepared by Geocon, dated April 12, 2012, is included in the Information Handout.

Petroleum-contaminated material will be encountered during roadway, piling, and foundation excavation work. Additional petroleum-contaminated material not encountered during the site investigation may be present on the job site.

Groundwater is found between 3 and 7 feet below ground surface (bgs).

##### **14-11.12A(4) Applicable Rules and Regulations**

Excavation and management of petroleum-contaminated material must comply with the rules and regulations of:

1. San Francisco Regional Water Quality Control Board (SFRWQCB), Region 2
2. Bay Area Air Quality Management District (BAAQMD)

3. California Division of Occupational Safety and Health Administration (CAL-OSHA)
4. Contra Costa County Department of Health and Human Services (Martinez)

Laws and regulations that govern work related to petroleum-contaminated material include:

1. Water Code, Division 7 (Porter-Cologne Water Quality Control Act)
2. Title 8, California Code of Regulations

#### **14-11.12A(5) Submittals**

##### **14-11.12A(5)(a) Health and Safety Plan**

Prepare and submit a detailed health and safety plan signed by an industrial hygienist certified in comprehensive practice by the American Board of Industrial Hygiene for site personnel. The health and safety plan must:

1. Identify potential health and safety hazards associated with work involving petroleum-contaminated material
2. Specify work practices that will be used to protect workers from those hazards in conformance with Title 8
3. Identify key site safety personnel
4. Describe risks associated with the work
5. Describe training requirements
6. Describe appropriate personal protective equipment
7. Describe site-specific medical surveillance requirements
8. Describe air monitoring requirements
9. Define appropriate site work zones
10. Describe decontamination requirements

Submit the health and safety plan, as an action submittal, at least 15 days before starting excavation work.

##### **14-11.12A(5)(b) Excavation and Transportation Plan**

Prepare and submit a detailed Excavation and Transportation Plan. Include in the plan:

1. Schedule for excavation
2. Stockpile location(s)
3. Stockpiling procedures
4. Dust control measures
5. Transportation equipment and routes
6. Truck waiting and staging areas
7. Spill prevention measures
8. Site for disposal of material

Submit the plan at least 20 days before starting excavation. Allow 10 days for the Engineer to review and approve the plan. If revisions are required, as determined by the Engineer, revise and resubmit the plan within 5 days of receipt of the Engineer's comments and allow 5 days for the Engineer to review the revisions. Do not start excavation until the Engineer has approved the plan.

##### **14-11.12A(6) Safety Training**

Before performing work, provide a safety training program to workers, including subsequent training required until completion of work, that communicates potential health and safety hazards associated with work involving petroleum-contaminated material and instructs personnel in procedures for doing the work safely. The level of training provided must be consistent with the person's job function and must comply with OSHA and CAL-OSHA regulations. Personal protective equipment, training, and washing facilities required by the health and safety plan for personnel working within the exclusion zone must be supplied to State personnel. The number of State personnel requiring the safety training program and personal protective equipment is 5.

##### **14-11.12B Materials**

Not Used

### **14-11.12C Construction**

#### **14-11.12C(1) Excavation and Stockpiling**

Continuously monitor the excavation site and excavated material as it is excavated, using appropriate air monitoring devices consistent with the health and safety plan.

Prevent any surface runoff from entering the excavated area.

Stockpile all excavated material for disposal analysis.

Stockpile locations must comply with:

1. Store material on undamaged 0.06-inch high-density polyethylene or an equivalent impermeable barrier unless stockpiling is on a paved surface. If the stockpile is on a paved surface, the thickness of the barrier can be reduced to 0.02-inch.
2. The barrier must extend a minimum of 18 inches beyond the stockpile.
3. Seal seams in the barrier to prevent leakage.
4. At the end of each day, stockpiled material with undamaged 0.012-inch polyethylene or an equivalent impermeable barrier to prevent windblown dispersion and precipitation run-off and run-on. When more than one sheet is required to cover the material, securely overlap sheets a minimum of 18 inches so they are kept in place at all times. Do not use driven anchors except at the perimeter of the stockpile.
5. Stockpiling requirements apply to temporary storage of material outside of excavations or transport containers including staging excavated material next to excavations prior to pick up by loading equipment, accumulating material for full transport loads, and waiting for test results. Clean up the site after removal and disposal of stockpiled materials.
6. If excavated material is found to contain hydrocarbon staining or odor, or exhibits unnatural color or other indications of hydrocarbon content, segregate from other excavated material and stockpile separately.

#### **14-11.12C(3) Disposal**

The Engineer will test excavated material for petroleum concentrations.

Submit a request for testing when material is ready for disposal. Allow 5 days for test results and disposal verification.

When tests verify that material is not petroleum-contaminated material, dispose of the material at any disposal site within 15 days of test results.

If test results indicate that material does require special disposal, dispose of the material within 15 days of results.

Remove petroleum-contaminated material from exteriors of transport vehicles and place into the transport vehicle, stockpile, or storage container before vehicles leave the area of excavation or stockpiling.

Reduce moisture content as needed before transporting material.

Prevent spillage of petroleum-contaminated material onto public roads.

For bidding purposes, assume that material will not exceed the thresholds in Paragraph 14-11.12A(2).

#### **14-11.12D Payment**

Disposal of petroleum-contaminated material will be paid for as extra work.

AA

## 15 EXISTING FACILITIES

Replace section 15-2.02B(3) with:

### 15-2.02B(3) Cold Planing Asphalt Concrete Pavement

#### 15-2.02B(3)(a) General

Schedule cold planing activities to ensure that cold planing, placement of HMA, and reopening the area to traffic is completed during the same work shift.

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 to the Engineer 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 15-2.04F with:**

**15-2.04F Reconstruct Down Drains**

Section 15-2.04F includes specifications for removing and installing portion of the down drains.

Materials and installation of the down drains must comply with section 75-1.03D.

Fill existing down drain with grout as shown. Grout must comply with section 50-1.02C.

**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 one 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 culverts or pipelines is included in the payment for abandon culvert or abandon pipeline. Payment for backfilling outside the culvert or pipeline is included in the payment for abandon culvert or abandon pipeline.

**Add to section 15-4.01A(2):**

The Department's review time for work plans for removing specific structures or portions of structures is shown in the following table:

Structure or portion of structure	Review time
Mococo Overhead Retrofit Bridge No. 28-0171L	40 days
Mococo Southbound Off-ramp Brige No. 28-0171S	20 days

**Add to section 15-4.01C(1):**

Remove the following bridges or portions of bridges:

Bridge no.	Description of work
28-0171L	Remove existing cable restrainers, shear keys, and parapet wall as shown.
28-0171S	Remove reinforced concrete slab bridge, including wingwalls, columns, and piles as shown.

**Add to section 15-5.07B(1):**

Submit a work plan for locating existing reinforcement before coring through concrete.

The plan must include:

1. Schedule of coring work at each bent
2. Description of equipment for locating existing reinforcement
3. Other alternative methods for locating existing reinforcement if initial plan fails

**Replace the 2nd paragraph in section 15-5.07B(2) with:**

Dowels must be HS threaded rods that comply with section 55.



**Replace the 6th paragraph of section 19-9.03 with:**

Complete shoulder backing within 5 days after placement of adjacent new surfacing except complete shoulder backing within 15 days wherever edge treatment under section 39-1.30 is placed.

**Add to section 19:**

**19-10 CELLULAR CONCRETE LIGHTWEIGHT EMBANKMENT MATERIAL**

**19-10.01 GENERAL**

**19-10.01A Summary**

Section 19–10 includes specifications for placing cellular concrete lightweight embankment material to the lines, grades and dimensions shown.

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

Cellular Concrete Class	Class Density Range pcf	Minimum Compressive Strength psi
I	24-29	10
II	30-35	40
III	36-41	80
IV	42-49	120
V	50-79	160
VI	80-90	300

**19-10.01B Submittals**

**19-10.01B(1) Mix Design**

Submit a mix design that will produce a cast density at point of placement and a minimum compressive strength for the class described. Include laboratory data using the mix design verifying mass and strength requirements

**19-10.01B(2) Work Plan**

Submit the work plan before placement of embankment material.

The plan includes:

1. Proposed construction sequence and schedule
2. Type of equipment and tools to be used.
3. Material list of items and manufacturer's specifications

**19-10.02 MATERIALS**

**19-10.02A General**

Not Used

**19-10.02B Admixtures**

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

**19-10.02B Water**

Mixing water shall be potable and free of deleterious amounts of acids, alkali, salts, oils, and organic materials which would adversely affect the setting or strength of the cellular concrete.

**19-10.02C Portland cement**

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

### 19-10.03 CONSTRUCTION

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

A minimum 12 hour curing period between lifts is required. If ambient temperatures are anticipated to be below 40 degrees F within 24 hours after placement, the mixing water must be heated when approved by the manufacturer of the foaming agent or placement must be prohibited. Placement must not be allowed on frozen ground.

Cellular concrete must be job site batched, mixed with the foaming agent and placed with specialized equipment certified by the manufacturer of the cellular concrete lightweight material. Cement and water may be premixed and delivered to the job site and foaming agent added on site.

At the point of placement, the density must comply with the specified cast density. A single cast density test must represent the lesser of 300 cy or 1 day's production.

The compressive strength must be tested under ASTM C 485 except as follows:

1. Unless otherwise approved, the specimens must be 3 x 6 inch cylinders. During molding, place the concrete in 2 equal layers and raise and drop the cylinders 1 inch, 3 times on a hard surface or lightly tap the side or bottom of the cylinder to close any accidental entrained air. No rodding is allowed.
2. Specimens must be covered and protected immediately after casting to prevent damage and loss of moisture. Specimens must be moist cured in the molds for 7 days and air dry a minimum of 24 hours and maximum of 72 hours before the 28 day compressive strength test. Specimens must not be oven dried.

Lift thickness must not exceed 3 feet. After curing for 12 hours, any crumbling area on the surface must be removed and scarified before the next layer is placed. Surface stepping to achieve grade and super elevation must not be less than 6 inches in thickness. Grades of up to 5 percent may be made by adding a thickening agent to the mix in conformance with the manufacturer's recommendation. If more than 1 lift is required, scarify the layer to receive the next lift with a broom or rake.

### 19-10.04 PAYMENT

Not Used

**Add to section 19:**

### 19-11 LIGHTWEIGHT AGGREGATE IMPORTED BORROW

#### 19-11.01 GENERAL

##### 19-11.01A Summary

Section 19-11 includes specifications for placing and compacting lightweight aggregate imported borrow.

Lightweight aggregate imported borrow must consist of a rotary kiln expanded shale aggregate of the extruded type or a processed, naturally-occurring volcanic aggregate.

#### 19-11.02 MATERIALS

Lightweight aggregate imported borrow material, when deposited in place, must comply with the grading and quality requirements shown in the following tables:

**Grading Requirements**

Sieve sizes	Percentage passing
1-1/2"	100
1"	95-100
3/4"	90-100
3/8"	15-85
No. 4	0-9

NOTE: Grading will be determined in conformance with the requirements of California Test 202, except shaking in the sieves must be limited to 5 minutes.

### Quality Requirements

Test	Requirement
Resistance (R-Value)	50 min
Durability Index	35 min

Lightweight aggregate imported borrow must have a maximum calculated saturated surface dry unit weight of 55 pcf.

Calculate the saturated surface dry unit weight using the dry loose unit weight and the absorption of the coarse and fine aggregates.

Calculate the dry loose unit weight under California Test 212, using test procedure (b) Compaction Method (by jigging).

Calculate absorption of the coarse and fine aggregates under California Tests 206 and 207, except that the samples must be oven dry before soaking and must be soaked for 24 hours ±30 minutes.

Calculate saturated surface dry unit weight as follows:

1. Multiply the percent coarse aggregate by the absorption of the coarse aggregate
2. Multiply the percent fine aggregate by the absorption of the fine aggregate
3. Add the 2 values from item 1 and 2, and divide it by 10,000
4. Add the value from item 1 to the result from 3, and multiply it by the dry loose unit weight.

#### 19-11.03 CONSTRUCTION

Place and compact lightweight aggregate imported borrow under section 19-6 except, the 1st paragraph in section 19-6.03A does not apply.

Initial layers of lightweight aggregate imported borrow may be placed by end dumping from trucks, or by any other method authorized.

Place and spread lightweight aggregate imported borrow in such a manner that will prevent bulking of the material and minimize particle breakdown.

Compact imported borrow in uniform layers of no greater than 8" thickness before compaction.

Compaction is attained by a minimum of 3 complete coverage passes using smooth drum steel roller compaction equipment imposing contact force of 670 pounds per foot width of the roller face.

If authorized, you may use a track type equipment which imposes the equivalent contact pressure as that specified for steel drum rollers provided the 3 complete coverages of the tracks are achieved.

Compaction using pneumatic-tired equipment or compaction within trenches or other limited-access areas, or compaction in areas of low confining pressure must be authorized.

Other alternative methods for placing and compacting lightweight aggregate imported borrow must be authorized.

#### 19-11.04 PAYMENT

The payment quantity for imported borrow (lightweight aggregate) is the weight of aggregate determined under section 9-1.02D divided by 95 percent of the dry loose unit weight.

## 20 LANDSCAPE

**Add to section 20-1.01B of the RSS for section 20:**

**noxious weed species:** Noxious weed species are any species of plant that is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate, as designated by the county and in section 5004 of the California Department of Food and Agriculture Code.

Supporting information for field identification purposes including photographic gallery of noxious weeds can be found at the California Department of Food and Agriculture - "Encyloweedia" web site:

[http://www.cdfa.ca.gov/plant/ipc/encycloweedia/encycloweedia\\_hp.htm](http://www.cdfa.ca.gov/plant/ipc/encycloweedia/encycloweedia_hp.htm)

**Add to section 20-1.02C of the RSS for section 20:**

Select herbicides from the following table:

<b>Herbicides</b>						
Herbicide name	Herbicide type					
	Preemergent (granular)	Preemergent (non-granular)	Post- emergent	Selective	Non- selective	Systemic
Glyphosate			<b>X</b>			<b>X</b>

**Replace section 20-1.03C(1) of the RSS for section 20 with:**

Perform roadside clearing by:

1. Removing and disposing of trash and debris
2. Controlling the following pests:
  - 2.1. Insects
  - 2.2. Weeds
3. Removing existing plants as described

**Add to section 20-1.03C(3) of the RSS for section 20:**

Control noxious weed species in erosion control (dry seed) areas to be mowed after seeds have been sown by hand pulling.

If seeds are present or develop on noxious weed species before they are hand pulled, cover and tightly secure seed pods or seed heads with plastic bags to prevent dispersal.

Where pavement, dikes, curbs, sidewalks, walls, and fences are located 12 feet or more beyond erosion control (dry seed) areas to be mowed, limit mowing to 6 feet beyond these areas.

**Replace the 2nd paragraph in section 20-1.03C(4) of the RSS for section 20 with:**

Dispose of mowed material from initial and subsequent mowing during roadside clearing.

**Replace the 2nd paragraph of section 20-4.01A of the RSS for section 20:**

Plant establishment consists of caring for the plants and erosion control (dry seed) areas, including watering, fertilizing, pruning, replacing damaged plants, pest control, and operating and repairing of all existing irrigation facilities used and irrigation facilities installed as part of the new irrigation system.

**Add to section 20-4.01A of the RSS for section 20:**

The plant establishment period must be Type 2.

**Add to section 20-4.03A of the RSS for section 20:**

Mow hydroseed Types 4 and 5 areas after the seeds have set and have started to die back or when they exceed 12 inches in length, whichever occurs first. Mow to a height of 4 inches. Remove trash and debris before mowing.

**Add to section 20-4.03F of the RSS for section 20:**

After the 125th plant establishment working day, reapply erosion control (dry seed) to bare areas as ordered. Erosion control (dry seed) reapplication is change order work.

AA

**21 EROSION CONTROL**

**Add to section 21:**

**21-2 IMPORTED BIOFILTRATION SOIL**

**21-2.01 GENERAL**

**21-2.01A Summary**

Section 21-2 includes specifications for furnishing and applying imported biofiltration soil mix.

**21-2.01B Submittals**

Submit a certificate of compliance from the soil supplier.

Submit the compost producer's *Compost Technical Data Sheet* including test results and *Seal of Testing Assurance* certificate before mixing compost with sand and soil.

**21-2.01C Quality Control and Assurance**

Saturated hydraulic conductivity for imported biofiltration soil must be at least 5 inches per hour.

**21-2.02 MATERIALS**

**21-2.02A General**

Imported biofiltration soil consists of a uniform mixture of sand, compost, and topsoil. The ratio of the components of imported biofiltration soil by volume must be 2 parts sand, 1 part compost, and 0.5 part topsoil.

**21-2.02B Sand**

Sand must be free of wood, waste, coating such as clay, stone dust, carbonate, or any other deleterious material. All aggregate passing No. 200 sieve size must be non-plastic. Sand must be graded within the following limits:

Sieve Sizes	Percentage Passing
3/8"	100
No. 4	90 - 100
No. 8	70 - 100
No. 16	40 - 95
No. 30	15 - 70
No. 40	5-55
No. 100	0 - 15
No. 200	0 - 5

Grain size analysis results of the sand component must be performed under ASTM D 422.

**21-2.02C Compost**

Compost must comply with section 21-1.02M.



## DIVISION V SURFACINGS AND PAVEMENTS

### 39 HOT MIX ASPHALT

#### Add to section 39-1.01:

Produce and place HMA Type A under the Standard construction process.

#### Add to section 39-1.02C:

Asphalt binder used in HMA Type A must be PG 64-10.

#### Add to section 39-1.02E:

Aggregate used in HMA Type A must comply with the 3/4-inch HMA Types A and B gradation.

#### Add to section 39-1.11D of the RSS for section 39-1.11:

Pave shoulders adjacent to the lane before opening a lane to traffic.

#### Replace the 2nd through 4th paragraphs of section 39-1.15C with:

Spread with a self-propelled spreader. After spreading, minor HMA must be ready for compacting without further shaping.

Compact with a vibratory roller providing a minimum of 7,000 lb centrifugal force. With the vibrator on, compact at least 3 complete coverages over each layer, overlapping to prevent displacement. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the layer thickness is less than 0.08 foot, turn the vibrator off. Complete the 1st coverage before the mixture's temperature drops below 250 degrees F.

The finished surface must be:

1. Textured uniformly
2. Compacted firmly
3. Without depressions, humps, and irregularities
4. In compliance with the straightedge specifications for smoothness

#### 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 must be placed with each lift.



CALIFORNIA DEPARTMENT OF TRANSPORTATION  
 TRANSPORTATION LABORATORY

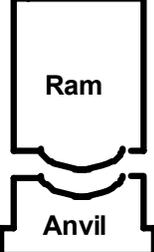
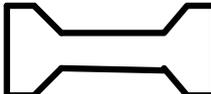
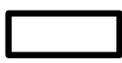
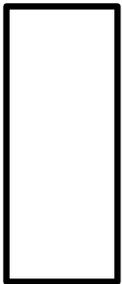
# PILE AND DRIVING DATA FORM

Structure Name : \_\_\_\_\_ Contract No.: \_\_\_\_\_

Project: \_\_\_\_\_

Structure No.: \_\_\_\_\_ Pile Driving Contractor or

Dist./Co./Rte./Post Mi: \_\_\_\_\_ Subcontractor \_\_\_\_\_ (Pile Driven By)

 <p style="text-align: center;"><b>Ram</b> <b>Anvil</b></p>	<b>Hammer</b>	Manufacturer: _____ Model: _____ Type: _____ Serial No.: _____ Rated Energy: _____ at _____ Length of Stroke _____ Modifications: _____ _____ _____ _____				
	<b>Capblock (Hammer Cushion)</b>	Material: _____ Thickness: _____ in Area: _____ in <sup>2</sup> Modulus of Elasticity - E: _____ ksi Coefficient of Restitution - e: _____				
	<b>Pile Cap</b>	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="padding: 2px;">Helmet</td></tr> <tr><td style="padding: 2px;">Bonnet</td></tr> <tr><td style="padding: 2px;">Anvil Block</td></tr> <tr><td style="padding: 2px;">Drivehead</td></tr> </table> Weight: _____ kips	Helmet	Bonnet	Anvil Block	Drivehead
Helmet						
Bonnet						
Anvil Block						
Drivehead						
	<b>Pile Cushion</b>	Material: _____ Thickness: _____ in Area: _____ in <sup>2</sup> Modulus of Elasticity - E: _____ ksi Coefficient of Restitution - e: _____				
	<b>Pile</b>	Pile Type: _____ Length (In Leads): _____ ft Lb/ft.: _____ Taper: _____ Wall Thickness: _____ in Cross Sectional Area: _____ in <sup>2</sup> Design Pile Capacity: _____ kips Description of Splice: _____ _____ Tip Treatment Description: _____ _____				

**DISTRIBUTE:**

Translab,  
Foundation Testing

Translab,  
Geotechnical Design

Resident Engineer

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By: \_\_\_\_\_

Date: \_\_\_\_\_ Phone No.: \_\_\_\_\_

**Add to section 49-2.01C(2):**

If you encounter obstructions to driving, provide special driving tips or heavier pile sections, or subexcavate below the bottom of footing, or take other measures to prevent damage to the pile during driving.

**Replace section 49-2.01C(3) with:**

**49-2.01C(3) Drilling**

Do not use drilling to attain the specified tip elevation shown for driven piles.

**Delete the 4th paragraph of section 49-2.01C(5).**

**Add to section 49-2.02B(1)(a):**

Steel pipe piling shown in the following table must comply with the specifications for Class N steel pipe piling:

Bridge name or no.	Abutment no.	Bent no.
28-0171S	N/A	2 through 7

**Replace the 1st paragraph of section 49-2.05B with:**

Steel sheet piling must comply with ASTM A 690/A 690M for interlocking marine grade steel sheet piling and be manufactured by the hot rolling method.

**Add to section 49-2.05B:**

Concrete anchors must comply with the specifications for stud connectors in section 55.

Stud connectors must be Type B complying with clause 7 of AWS D1.5.

**Add to section 49-2.05C:**

Clean and prepare piles in heat affected areas before welding concrete anchors.

**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 around the pile reinforcing cage, in contact with the inside of 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 INTERNATIONAL LLC 735 BOARD ST STE 209 CHATTANOOGA TN 37402 (423) 266-6964
Super Mud	PDS CO INC 105 W SHARP ST EL DORADO AR 71731 (870) 863-5707
Shore Pac GCV	CETCO CONSTRUCTION DRILLING PRODUCTS 2870 FORBS AVE HOFFMAN ESTATES IL 60192 (800) 527-9948
Terragel or Novagel Polymer	GEO-TECH SERVICES LLC 220 N. ZAPATA HWY STE 11A-449A LAREDO TX 78043 (210) 259-6386

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 <sup>a</sup>
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf <sup>a</sup>
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

<sup>a</sup>If 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 <sup>a</sup>
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf <sup>a</sup>
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

<sup>a</sup>If 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 <sup>a</sup>
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf <sup>a</sup>
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

<sup>a</sup>If 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 <sup>a</sup>
Before final cleaning and immediately before placing concrete		≤ 64.0 pcf <sup>a</sup>
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

<sup>a</sup>If 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(5):**

Install permanent steel casings by impact or by placing in a drilled hole.

**Replace item 3 in the list in the 2nd paragraph of section 49-3.02C(5) with:**

- Fill voids in the annular space between the casing and the soil or bedrock with grout.

**Add to section 49-3.03B:**

**Replace item 4 in the list in the 3rd paragraph of section 49-3.03C(2) with:**

- 4. The bottom 6 feet of the pile must not be cleaned out.

**Add to section 49-3.03C(2):**

Drilling through the center of open-ended steel shells to attain the specified tip elevation may be necessary. The diameter of the drilled hole must be less than the inside diameter of the piling. Equipment or methods used for drilling holes must not cause quick soil conditions or cause scouring or caving of the hole. Drilling must not be used within 6 feet of the specified tip elevation.

AA

**51 CONCRETE STRUCTURES**

**Add to section 51-1.01A:**

Lumber blocking must comply with section 57-2.04.

Concrete for joint seal assembly must comply with one of the following:

- 1. Cure for at least 5 days before opening to traffic
- 2. Comply with the specifications for RSC

**Add to section 51-1.01C:**

**51-1.01C(6) Non-shrink Grout**

Conduct testing of the proposed non-shrink grout under ASTM Designation:C 1107 and submit test results.

Submit at least 45 pound sample of the proposed non-shrink grout dry mixture in an air tight sealed container to the Engineer. Allow 45 days for testing.

**Add to section 51-1.02:**

**51-1.02J Non-shrink Grout**

Non-shrink grout must consist of cement based grout with mineral aggregate. Non-shrink grout must be premeasured and prepackaged by the manufacturer, and must be suitable for baseplate and foundation grouting.

Grout containing metallic aggregate, expansive cement, or gas generating additives will not be permitted.

Non-shrink grout must comply with ASTM Designation: C1107, Grade C, and the following requirements:

NON-SHRINK GROUT		
PROPERTY	REQUIREMENT	TEST METHOD
* Shrinkage	0.0°%	ASTM C 827
* Expansion	0.0 minimum, 4.0°% maximum	ASTM C 827
* 3°day compressive strength	4000°psi, minimum	ASTM C 109
*28°day compressive strength	7000°psi, minimum	ASTM C 109











**Replace "Reserved" in section 83-1.02B(1) with:**

**83-1.02B(1)(a) General**

Section 83-1.02B(1) includes specifications for constructing vegetation control areas around guardrail posts with minor concrete.

Submit the mix design for the minor concrete to be used for vegetation control. Include compressive strength test results with your mix design.

Submit the quantity in pounds of crumb rubber with your certificate of compliance for crumb rubber aggregate if used.

**83-1.02B(1)(b) Materials**

**83-1.02B(1)(b)(i) General**

Not Used

**83-1.02B(1)(b)(ii) Minor Concrete**

Minor concrete must include reinforcing fibers and may include crumb rubber aggregate.

Section 90-2.02B does not apply. Minor concrete must contain at least:

1. 505 pounds of cementitious material per cubic yard if crumb rubber aggregate is used
2. 400 pounds of cementitious material per cubic yard if crumb rubber aggregate is not used

The 3rd paragraph of section 90-2.02C does not apply. Minor concrete must have a maximum aggregate size of 3/8 inch.

You may use volumetric proportioning under ASTM C 685/C 685M or section 90-3.02B.

Minor concrete must have a 28-day compressive strength from 1,400 to 1,800 psi.

**83-1.02B(1)(b)(iii) Crumb Rubber Aggregate**

Crumb rubber must consist of ground or granulated scrap tire rubber from automobile and truck tires. Tire buffings are not allowed. Crumb rubber aggregate must be ground and granulated at ambient temperature.

The gradation of the crumb rubber aggregate must meet the requirements of the following table:

Sieve size	Percentage passing
1/2"	100
3/8"	90-100
1/4"	35-45
No. 4	5-15
No. 8	0-5
No. 16	0

Crumb rubber aggregate must not contain more than 0.01 percent of wire by mass of crumb rubber and must be free of oils and volatile organic compounds.

Commingling of crumb rubber from different sources is not allowed.

The crumb rubber aggregate must be 3.5 ± 0.5 percent by weight of the concrete.

**83-1.02B(1)(b)(iv) Reinforcing Fibers**

Reinforcing fibers for minor concrete must be:

1. Polypropylene fibers with an engineered sinusoidal contoured profile manufactured specifically for use as concrete reinforcement.
2. Blended ratio of 4 parts by weight of coarse monofilament fibers with maximum individual fiber lengths of 2 ± 1/2 inch and 1 part by weight of fine fibrillated polypropylene fibers of various lengths

and thicknesses. If the coarse and fine reinforcing fibers are supplied by the same manufacturer, they may be premixed in a sealed 5 lb degradable bag.

3. From a commercial source.
4. Concrete ingredient as described in your mix design and as recommended by the manufacturer.

The reinforcing fiber content of minor concrete must be 5 lb/cu yd.

### **83-1.02B(1)(b)(v) Coloring Agent**

If a color for concrete is specified in section 83-1.02B(1)(b)(i), the coloring agent must be integral to the concrete mix and added at the concrete plant.

If the curing compound method is used, use curing compound no. 6.

### **83-1.02B(1)(b)(vi) Block-Out Material**

Use a commercially-available expanded polystyrene foam for the block-out material. The expanded polystyrene foam must have a compressive strength of  $13 \pm 5$  psi at 10 percent deformation when tested under ASTM D1621.

You may substitute any appropriate material that meets the compressive strength requirements of the expanded polystyrene foam if authorized.

### **83-1.02B(1)(c) Construction**

#### **83-1.02B(1)(c)(i) General**

Areas to receive vegetation control must be cleared of vegetation, trash, and debris. Dispose of removed material.

#### **83-1.02B(1)(c)(ii) Earthwork**

Excavate areas to receive vegetation control. 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 2 inches before removing the surfacing. The finished elevation of the excavated area to receive vegetation control must maintain planned flow lines, slope gradients, and contours of the job site.

Grade areas to receive vegetation control to a smooth, uniform surface and compact to a relative compaction of not less than 95 percent.

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

#### **83-1.02B(1)(c)(iii) Block Out**

Install block-out material as shown.

If block-out material is supplied in more than 1 piece, tape the pieces together to make a smooth surface on the top and sides.

Ensure block-out material does not move during concrete placement.

#### **83-1.02B(1)(c)(iv) Placing Minor Concrete**

Place minor concrete for vegetation control by hand.

Strike off and compact minor concrete with a mechanical or vibratory screed device. Apply a broom finish. Match the finished grade to the adjacent section of vegetation control, pavement, shoulder, or existing grade.

#### **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**

**83-1.02C(2)(a) General**

**83-1.02C(2)(a)(i) Summary**

Install alternative in-line terminal system as described.

**83-1.02C(2)(a)(ii) Submittals**

Submit:

1. A certificate of compliance for terminal systems
2. Manufacturer's installation instructions

**83-1.02C(2)(b) Materials**

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

1. TYPE SKT-MGS TERMINAL SYSTEM - Type SKT-MGS terminal system must be an SKT 350 sequential kinking terminal, system length 53'-1-1/2", manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type SKT-MGS 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-PLUS 31 TERMINAL SYSTEM - Type ET-PLUS 31 terminal system must be an ET-2000 PLUS (4-tube system) extruder terminal, system length 53'-1-1/2", as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type ET-PLUS 31 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.

**83-1.02C(2)(c) Construction**

Install terminal systems under the manufacturer's installation instructions and these specifications. Identify each terminal system installed 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 post numbers 4 and 5.

For Type ET-PLUS 31 terminal system, install a hinged breakaway post at Post 1 and 6-foot steel yielding terminal posts at Posts 2 through 6. The hinged breakaway post may be either driven, with or without pilot holes, or placed in drilled holes. If placed in a pilot or drilled hole, backfill the space around the hinged breakaway post with selected earth, free of rock, placed in layers approximately 4 inches thick and moisten and thoroughly compact each layer.

For Type ET-PLUS 31 terminal system, install 4'-6" steel foundation tubes with soil plates attached or 6-foot soil tubes at Posts 1 and 2. Install 6-foot controlled release terminal posts at Posts 3 through 6. The steel foundation tubes may be either driven with or without pilot holes, or placed in drilled holes. Backfill the space around the steel foundation tubes with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer. Insert the wood terminal posts into the steel foundation tubes by hand. Before the wood terminal posts are inserted, coat the inside surfaces of the steel foundation tubes to receive the wood posts with a grease that will not melt or run at a temperature of 149 degrees F or less. Slightly round the edges of the wood terminal posts to facilitate insertion of the post into the steel foundation tubes.

For Type SKT-MGS terminal system, install the soil tube with soil plate attached at Post 1, hinged breakaway post at Post 2, and 6-foot W6x9 steel posts at Posts 3 through 8. Use a W6x15 steel post at Post 1. The soil tube with soil plate may be driven with or without pilot holes, or placed in drilled holes. Backfill the space around the steel foundation tubes with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer.

For Type SKT-MGS terminal system, install the soil tube with soil plate attached at Post 1, breakaway cable terminal post at Post 2, and controlled release terminal posts at Posts 3 through 8. The soil tube may be driven with or without pilot holes, or placed in a drilled hole. Backfill the space around the steel

foundation tube with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer. Insert a wood post into the steel foundation tube by hand. Before the wood terminal post is inserted, coat the inside surfaces of the steel foundation tube to receive the wood post with a grease that will not melt or run at a temperature of 149 degrees F or less. Slightly round the edge of the wood post to facilitate insertion of the post into the steel foundation tube.

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

### **83-1.02C(2)(d) Payment**

Not Used

### **Replace section 83-1.02C(3) with:**

### **83-1.02C(3) Alternative Flared Terminal System**

#### **83-1.02C(3)(a) General**

#### **83-1.02C(3)(a)(i) Summary**

Install alternative flared terminal system as described.

#### **83-1.02C(3)(a)(ii) Submittals**

Submit:

1. A certificate of compliance for terminal systems
2. Manufacturer's installation instructions

#### **83-1.02C(3)(b) Materials**

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

1. TYPE FLEAT-MGS TERMINAL SYSTEM - Type FLEAT-MGS terminal system must be a Flared Energy Absorbing Terminal 350, system length 37'-6", manufactured by Road Systems, Inc., located in Big Spring, Texas, and must include items detailed for Type FLEAT-MGS 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 13<sup>th</sup> Street, S.W., Canton, OH 44708, telephone (330) 477-4800.
2. TYPE SRT-31 TERMINAL SYSTEM - Type SRT-31 terminal system must be an SRT-350 Slotted Rail Terminal (6-post system), system length 37'-6", as manufactured by Trinity Highway Products, LLC, and must include items detailed for Type SRT-31 terminal system shown. The SRT-350 Slotted Rail Terminal (6-post system) can be obtained from the manufacturer, Trinity Highway Products, LLC, P.O. Box 99, Centerville, UT 84012, telephone (800) 772-7976.

#### **83-1.02C(3)(c) Construction**

Install terminal systems under the manufacturer's installation instructions and these specifications. Identify each terminal system installed 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 post numbers 4 and 5.

For Type FLEAT-MGS terminal system with steel posts, install the soil tube with soil plate attached at Post 1, hinged breakaway post at Post 2, and 6-foot W6x9 steel posts at Posts 3 through 7. Use a W6x15 steel post at Post 1. The soil tube with soil plate may be driven with or without pilot holes, or placed in drilled holes. Backfill the space around the steel foundation tubes with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer.

For Type FLEAT-MGS terminal system with wood posts, install the soil tubes with soil plate attached at Posts 1 and 2, breakaway cable terminal posts at Posts 1 and 2, and controlled release terminal posts at Posts 3 through 6. The soil tubes with soil plates may be driven with or without pilot holes, or placed in drilled holes. Backfill the space around the steel foundation tubes with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer. Insert the breakaway cable terminal posts into the steel foundation tubes by hand.

For Type SRT-31 terminal system, install a cable release post at Post 1 and 6-foot steel yielding terminal posts at Posts 2 through 6. The cable release post and steel yielding terminal posts may be either driven with or without pilot holes, or placed in drilled holes. If placed in pilot or drilled holes, backfill the space around the posts with selected earth, free of rock, placed in layers approximately 4 inches thick, and moisten and thoroughly compact each layer.

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

**83-1.02C(3)(d) Payment**

Not Used

**Replace the 1st sentence of the 1st paragraph of section 83-1.03 with:**

Except for guardrail within the pay limits of a terminal system, a transition railing (Type WB-31), an end anchor assembly, or a railing tensioning assembly, midwest guardrail system is measured along the face of the rail element from end post to end post of the completed railing.

**Add to section 83-2.02D(1):**

Type 60K portable concrete barrier must consist of interconnected new or undamaged used precast portable concrete barrier units and must comply with the following:

1. Concrete must be minor concrete. Load tickets and a certificate of compliance are not required.
2. Bar reinforcing steel must comply with section 52.
3. Steel plates must comply with ASTM A 36/A 36M. The connection pin must be a round bar complying with ASTM A 36/A 36M. After fabrication, steel plates must be galvanized under section 75-1.05.
4. Final surface finish must comply with section 51-1.03F(2).
5. Exposed surfaces of concrete elements must be cured by the water method, the forms-in-place method, or the curing compound method. The curing compound must be curing compound no. 1.
6. Barrier must have the fabrication date and the Contractor's name or logo on each panel. The fabrication date and name or logo must not be more than 4 inches in height and must be located not more than 12 inches above the bottom of the rail panel.
7. Barrier must be set on firm, stable foundation. The foundation must be graded to provide a uniform bearing throughout the entire length of the railing.
8. Excavation and backfill must comply with section 19-3.
9. Abutting ends of precast concrete units must be placed and maintained in alignment without substantial offset to each other. The precast concrete units must be positioned straight on tangent alignment and on a true arc on curved alignment. The minimum curve radius for the horizontal alignment of the barrier is 164 feet.

Submit a certificate of compliance for all new or used Type 60K portable concrete barrier that is not cast on the job site.

Type 60K portable concrete barrier is measured along the top of the barrier.

**Replace section 83-2.02E(6) with:**

**83-2.02E(6) Type SCI-100GM Crash Cushion**

Type SCI-100GM crash cushion must be installed where shown.

Type SCI-100GM crash cushion must be SCI-100GM (TL-3) as manufactured by, by SCI Product Inc. and must include the items shown for the crash cushion.

The successful bidder can obtain the crash cushion from the manufacturer, the Work Area Protection Corp., P.O. Box 4087, 2500 Production Drive, St Charles, IL 60174-9081, telephone (630) 377-9100, Fax (630) 377-9270 or from the manufacturer's distribution agent, D&M Traffic Services, 845 Reed Street, Santa Clara, CA 95050, telephone (408) 436-1127, Fax (408) 436-1675.

The price quoted by the manufacturer for the crash cushion, SCI-100GM (TL-3), D&M Traffic Services is \$31,509, not including sales tax.



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, the Contractor must provide provisions for temporary or portable detection operations. The Contractor 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 the Contractor's activity, where the elements are not fully functional, the Engineer must be notified immediately. If the Contractor is notified by the Engineer that existing TMS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed TMS elements, excluding structure-related elements, must be repaired or replaced, at the Contractor's expense, within 24 hours. For a structure-related elements, the Contractor 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.

The Contractor must demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment. If the Contractor fails 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 the Contractor.

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.

The Contractor must provide provisions for replacing existing TMS elements within the project limits, including detection systems, that were not identified on the plans or during the pre-construction operational status check that became damaged due to the Contractor's activities.

If the pre-construction operational status check identified existing TMS elements, then the Contractor, 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 the Contractor. 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 the Contractor's 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 the Contractor is 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-B standards. The bottom of the base plate must be flush with finished grade.

**Add to section 86-2.04A:**

Where the side tenon detail at the end of the signal mast arm is shown, you may substitute the applicable tip tenon detail.

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.

**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.

At other locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the trenching in pavement method.

**Replace the 3rd paragraph in section 86-2.06A(2) of the RSS for section 86-2.06 with:**

In a ground or sidewalk area, embed the bottom of a pull box in crushed rock.

**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**

Section 86-2.06B includes specifications for installing non-traffic-rated pull boxes.

**86-2.06B(1)(b) Submittals**

Before shipping pull boxes to the job site, submit a list of materials used to fabricate the pull boxes to METS. Include:

1. Contract number
2. Manufacturer's name
3. Manufacturer's installation instructions
4. Your contact information

Submit reports for pull boxes from an NRTL-accredited laboratory.

Before installing a pull box and cover, submit the manufacturer's replacement warranty for them.

**86-2.06B(1)(c) Quality Control and Assurance****86-2.06B(1)(c)(i) Functional Testing**

The pull box and cover must be tested under ANSI/SCTE 77, "Specification for Underground Enclosure Integrity."

**86-2.06B(1)(c)(ii) Warranty**

Provide a 2-year manufacturer's replacement warranty for the pull box and cover. The warranty period starts on the date of Contract acceptance.

Deliver replacement parts within 5 business days after you receive notification of a failed pull box, cover, or both to the Department's Maintenance Electrical Shop at:

Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500.

**86-2.06B(2) Materials**

The pull box and cover must comply with ANSI/SCTE 77, "Specification for Underground Enclosure Integrity," for tier 22 load rating and must be gray or brown.

Each pull box cover must have an electronic marker cast inside.

A pull box extension must be made of the same material as the pull box and attached to the box to maintain the minimum combined depths.

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 design.

The captive bolt must be capable of withstanding a torque from 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.

Hardware must be stainless steel with 18 percent chromium and 8 percent nickel content.

Galvanize ferrous metal parts under section 75-1.05.

The manufacturer's instructions must include:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below the tier 22 load rating
2. Locations where side entries cannot be made
3. Acceptable method for creating the entry

The 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 a 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 the 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.

Cover the pull box with a plastic sheet and then bury it in soil from 6 to 8 inches below grade.

Plastic sheets must be 20 mil thick and made of HDPE or PVC virgin compounds.

**Add to section 86-2.08A:**

Wrap conductors and cables to the projecting end of the conduit in pull boxes.

**Replace the 1st paragraph of section 86-2.09E with:**

Splices must be insulated by "Method B."

**Add to section 86-2.11A:**

Circuit breakers must be the cable-in/cable-out type mounted on non-energized clips. All circuit breakers must be mounted vertically with the up position of the handle being the "ON" position.

Each service must be provided with up to 2 main circuit breakers that will disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as described, each of the circuit breakers must have a minimum interrupting capacity of 10,000 A, rms.

**Replace 7th and 8th paragraphs of section 86-2.11A with:**

Service equipment enclosures must be the aluminum type.

**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 to the Engineer before installation. Replacement LED signal modules must be delivered to State Maintenance Electrical Shop at Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500.

**Add to section 86-4.01D(2)(a):**

LED signal module must be manufactured for 12-inch circular and arrow sections.

**Add to section 86-5.01A(1):**

Loop wire must be Type 2.

Loop detector lead-in cable must be Type B.

Slots must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

You may use a Type E loop where a Type A is shown.

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.

**Replace section 86-6.02 with:**

**86-6.02 LED LUMINAIRES**

**86-6.02A General**

**86-6.02A(1) Summary**

Section 86-6.02 includes specifications for installing LED luminaires.

### 86-6.02A(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, such as sidewalks at intersection or areas off 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 specifying test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

**LM-80:** Test method from the Illumination Engineering Society of North America specifying 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.

**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, such as traveled ways and freeway lanes.

**surge protection device (SPD):** Subsystem or component that protects 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.

### 86-6.02A(3) Submittals

Submit a sample luminaire to METS for testing after the manufacturer's testing is completed. Include the manufacturer's test 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. LM-79 and 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 isofotcandle 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:

1. Ensures the minimum specified performance level
2. Includes a documented process for resolving problems

Submit the QA documentation as an informational submittal.

Submit the manufacturer's warranty documentation as an informational submittal before installing LED luminaires.

### **86-6.02A(4) Quality Control and Assurance**

#### **86-6.02A(4)(a) General**

The Department may test random samples of the luminaires under section 86-2.14A. The Department tests luminaires under California Test 678 and may test any parameters specified in section 86-6.01.

Fit 1 sample luminaire with a thermistor or thermocouple temperature sensor. A temperature sensor must be mounted on the:

1. LED solder pad as close to the LED as possible
2. Power supply case
3. Light bar or modular system as close to the center of the module as possible

Other configurations must have at least 5 sensors per luminaire. The Engineer provides 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 $\Omega$ . Use the appropriate thermocouple wire. The leads must be a minimum of 6 feet. Submit documentation with the test unit describing the type of sensor used.

Before performing any testing, energize the sample luminaires for a minimum of 24 hours at 100 percent on-time duty cycle and a temperature of +70 degrees F.

Depreciate the luminaire lighting's performance 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 86-6.02 specifications is cause for rejection.

#### **86-6.02A(4)(b) Warranty**

Provide a 7-year manufacturer's warranty against any defects or failures. The warranty period begins on the date of Contract acceptance. Furnish a replacement luminaire within 10 days after receipt of the failed luminaire. The Department does not pay for the replacement. Deliver replacement luminaires to the Department's Maintenance Electrical Shop at:

Caltrans Electrical Maintenance Station, 30 Rickard Street, San Francisco, CA 94134, (415) 330-6500

### **86-6.02B Materials**

#### **86-6.02B(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 applications:

Application	Replaces
Roadway 1	200 W high-pressure sodium luminaire mounted at 34 ft
Roadway 2	310 W high-pressure sodium luminaire mounted at 40 ft
Roadway 3	310 W high-pressure sodium luminaire mounted at 40 ft with back side control
Roadway 4	400 W high-pressure sodium luminaire 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.

**86-6.02B(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 number
4. Serial number
5. Month and year of manufacture
6. Lot number
7. Contract number
8. Rated voltage
9. Rated wattage
10. Rated power in VA

**86-6.02B(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

**86-6.02B(4) Surge Suppression and Electromagnetic Interference**

The luminaire's 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 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 under 47 CFR 15, subpart B, for the emission of electronic noise.

**86-6.02B(5) Compatibility**

The luminaire must be operationally compatible with currently-used lighting control systems and photoelectric controls.

**86-6.02B(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> $\frac{x^2}{(82)^2} + \frac{(y - 20)^2}{(52)^2} = 1$ <p>for <math>y \geq 0</math> (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 20 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>

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

#### **86-6.02B(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 so the maximum junction temperature is not exceeded when the ambient outside temperature is 100 degrees F or greater.

#### **86-6.02B(8) Physical and Mechanical Requirements**

The luminaire must:

1. Be a single, self-contained device not requiring job-site assembly for installation
2. Have an integral power supply
3. Weigh no more than 35 lb
4. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end
5. Have a housing color that matches color number from 26152 to 26440, from 36231 to 36375, or 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 made 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. The housing's paint must comply with section 86-2.16. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

Provide each housing 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  $\pm 5$  degrees from the axis of the tenon in a minimum of 5 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's mounting brackets must develop a permanent set in excess of 1/32 inch when the bracket's two or four 3/8-inch-diameter cap screws 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 LED luminaire must be assembled and manufactured such that its 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 <sup>a</sup>	Installed	1.5 g peak-to-peak sinusoidal loading (same as 0.75 g peak)

<sup>a</sup>Perpendicular 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.

Furnish each mounted luminaire with an ANSI C136.10-compliant, locking-type photocontrol receptacle and a raintight shorting cap. The receptacle must comply with section 86-6.11A.

Furnish each mounted luminaire with an ANSI C136.41-compliant, locking-type photocontrol receptacle with dimming connections and a raintight 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.

#### **86-6.02C Construction**

Not Used

#### **86-6.02D Payment**

Not Used



**REVISED STANDARD SPECIFICATIONS  
APPLICABLE TO THE 2010 EDITION  
OF THE STANDARD SPECIFICATIONS**



**Add to the 1st table in section 1-1.06:**

04-19-13

LCS	Department's lane closure system
POC	pedestrian overcrossing
QSD	qualified SWPPP developer
QSP	qualified SWPPP practitioner
TRO	time-related overhead
WPC	water pollution control

**Delete the abbreviation and its meaning for *UDBE* in the 1st table of section 1-1.06.**

06-20-12

**Delete "Contract completion date" and its definition in section 1-1.07B.**

10-19-12

**Delete "critical delay" and its definition in section 1-1.07B.**

10-19-12

**Replace "day" and its definition in section 1-1.07B with:**

10-19-12

**day:** 24 consecutive hours running from midnight to midnight; calendar day.

1. **business day:** Day on the calendar except a Saturday and a holiday.
2. **working day:** Time measure unit for work progress. A working day is any 24-consecutive-hour period except:
  - 2.1. Saturday and holiday.
  - 2.2. Day during which you cannot perform work on the controlling activity for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due to any of the following:
    - 2.2.1. Adverse weather-related conditions.
    - 2.2.2. Maintaining traffic under the Contract.
    - 2.2.3. Suspension of a controlling activity that you and the Engineer agree benefits both parties.
    - 2.2.4. Unanticipated event not caused by either party such as:
      - 2.2.4.1. Act of God.
      - 2.2.4.2. Act of a public enemy.
      - 2.2.4.3. Epidemic.
      - 2.2.4.4. Fire.
      - 2.2.4.5. Flood.
      - 2.2.4.6. Governor-declared state of emergency.
      - 2.2.4.7. Landslide.
      - 2.2.4.8. Quarantine restriction.
    - 2.2.5. Issue involving a third party, including:
      - 2.2.5.1. Industry or area-wide labor strike.
      - 2.2.5.2. Material shortage.
      - 2.2.5.3. Freight embargo.
      - 2.2.5.4. Jurisdictional requirement of a law enforcement agency.
      - 2.2.5.5. Workforce labor dispute of a utility or nonhighway facility owner resulting in a nonhighway facility rearrangement not described and not solely for the Contractor's convenience. Rearrangement of a nonhighway facility includes installation, relocation, alteration, or removal of the facility.
  - 2.3. Day during a concurrent delay.
3. **original working days:**

- 3.1. Working days to complete the work shown on the *Notice to Bidders* for a non–cost plus time based bid.
- 3.2. Working days bid to complete the work for a cost plus time based bid.

Where working days is specified without the modifier "original" in the context of the number of working days to complete the work, interpret the number as the number of original working days as adjusted by any time adjustment.

**Replace "Contract" in the definition of "early completion time" in section 1-1.07B with:**

work

10-19-12

**Replace "excusable delay" and its definition in section 1-1.07B with:**

**delay:** Event that extends the completion of an activity.

10-19-12

- 1. **excusable delay:** Delay caused by the Department and not reasonably foreseeable when the work began such as:
  - 1.1. Change in the work
  - 1.2. Department action that is not part of the Contract
  - 1.3. Presence of an underground utility main not described in the Contract or in a location substantially different from that specified
  - 1.4. Described facility rearrangement not rearranged as described, by the utility owner by the date specified, unless the rearrangement is solely for the Contractor's convenience
  - 1.5. Department's failure to obtain timely access to the right-of-way
  - 1.6. Department's failure to review a submittal or provide notification in the time specified
- 2. **critical delay:** Excusable delay that extends the scheduled completion date
- 3. **concurrent delay:** Occurrence of at least 2 of the following events in the same period of time, either partially or entirely:
  - 3.1. Critical delay
  - 3.2. Delay to a controlling activity caused by you
  - 3.3. Non–working day

**Replace "project" in the definition of "scheduled completion date" in section 1-1.07B with:**

work

10-19-12

**Add to section 1-1.07B:**

**Contract time:** Number of original working days as adjusted by any time adjustment.

10-19-12

**Disadvantaged Business Enterprise:** Disadvantaged Business Enterprise as defined in 49 CFR 26.5.

06-20-12

**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







**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

**Add between "terminated" and ", you" in the 5th paragraph of section 5-1.13B(2):**

07-20-12

or substituted

**Replace the paragraphs of section 5-1.13C with:**

11-15-13

Section 5-1.13C applies to a non-federal-aid contract.

Use each DVBE as shown on the *Certified DVBE Summary* form unless you receive authorization from the Department for a substitution. The substitute must be another DVBE unless DVBEs are not available, in which case, you must substitute with a small business. Any authorization for a substitute is contingent upon the Department of General Services' approval of the substitute.

The requirement that DVBEs be certified by the bid opening date does not apply to DVBE substitutions after Contract award.

The Department authorizes substitutions for any of the reasons provided in 2 CA Code of Regs § 1896.73.

Include in your substitution request:

1. Copy of the written notice issued to the DVBE with proof of delivery
2. Copy of the DVBE's response to the notice
3. Name and certification number of the listed DVBE and the proposed substitute

Requests for substitutions of a listed DVBE with a small business must include documentation of the unavailability of DVBEs, including:

1. Contact with the small business/DVBE advocate from the Department and the Department of Veterans Affairs
2. Search results from the Department of General Services' website of available DVBEs
3. Communication with a DVBE community organization nearest the job site, if applicable
4. Documented communication with the DVBE and small businesses describing the work to be performed, the percentage of the total bid, the corresponding dollar amount, and the responses to the communication

The Department forwards your substitution request to the Department of General Services. The Department of General Services issues a notice of approval or denial. The Department provides you this notice.

If you fail to use a listed DVBE without an authorized substitution request, the Department issues a penalty of up to 10 percent of the dollar amount of the work of the listed DVBE.

Maintain records of subcontracts made with DVBEs. Include in the records:

1. Name and business address of each business
2. Total amount paid to each business

For the purpose of determining compliance with Pub Cont Code § 10115 et seq.:

1. Upon work completion, complete and submit *Final Report - Utilization of Disabled Veteran Business Enterprises (DVBE) State Funded Projects Only* form.
2. Upon reasonable notice and during normal business hours, permit access to its premises for the purposes of:
  - 2.1. Interviewing employees.
  - 2.2. Inspecting and copying books, records, accounts and other material that may be relevant to a matter under investigation.

**Replace "Reserved" in section 5-1.20C with:**

10-19-12

If the Contract includes an agreement with a railroad company, the Department makes the provisions of the agreement available in the *Information Handout* in the document titled "Railroad Relations and Insurance Requirements." Comply with the requirements in the document.

**Add between the 2nd and 3rd paragraphs of section 5-1.23A:**

10-19-12

Submit action and informational submittals to the Engineer.

**Add between the 5th and 6th paragraphs of section 5-1.23B(1):**

07-19-13

For a revised submittal, allow the same number of days for review as for the original submittal.

**Delete the 1st sentence in the 10th paragraph of section 5-1.23B(2).**

07-19-13

**Add to the list in the 1st paragraph of section 5-1.36A:**

07-19-13

10. Survey monuments

**Add to section 5-1.36C:**

07-20-12

If the Contract does not include an agreement with a railroad company, do not allow personnel or equipment on railroad property.

Prevent material, equipment, and debris from falling onto railroad property.

**Add to section 5-1.36:**

07-19-13

**5-1.36E Survey Monuments**

Protect survey monuments on and off the highway. Upon discovery of a survey monument not identified and located immediately:

1. Stop work near the monument
2. Notify the Engineer

Do not resume work near the monument until authorized.

**Add between the 1st and 2nd paragraphs of section 5-1.37A:**

10-19-12

Do not remove any padlock used to secure a portion of the work until the Engineer is present to replace it. Notify the Engineer at least 3 days before removing the lock.



**Replace "20 days" in the 14th paragraph of section 7-1.04 with:**

09-16-11

25 days

**Replace "90 days" in the 14th paragraph of section 7-1.04 with:**

09-16-11

125 days

**Add between the 18th and 19th paragraphs of section 7-1.04:**

09-16-11

Temporary facilities that could be a hazard to public safety if improperly designed must comply with design requirements described in the Contract for those facilities or, if none are described, with standard design criteria or codes appropriate for the facility involved. Submit shop drawings and design calculations for the temporary facilities and show the standard design criteria or codes used. Shop drawings and supplemental calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

**Replace the 2nd paragraph of section 7-1.11A with:**

07-27-12

A copy of form FHWA-1273 is included in section 7-1.11B. The training and promotion section of section II refers to training provisions as if they were included in the special provisions. The Department specifies the provisions in section 7-1.11D of the *Standard Specifications*. If a number of trainees or apprentices is required, the Department shows the number on the *Notice to Bidders*. Interpret each FHWA-1273 clause shown in the following table as having the same meaning as the corresponding Department clause:

**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

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.

**ATTACHMENTS**

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

**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.

**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).

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 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.

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.

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.

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.

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).

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.

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.

**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 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).

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 to 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.



**Replace "Contract" in the 3rd paragraph of section 8-1.02D(2) with:**

10-19-12

work

**Replace "Contract" in item 9 in the list in the 4th paragraph of section 8-1.02D(4) with:**

10-19-12

work

**Replace "Contract completion" in the 4th paragraph of section 8-1.02D(6) with:**

10-19-12

work completion

**Replace "Contract working days" in the 4th paragraph of section 8-1.02D(6) with:**

10-19-12

original working days

**Delete items 1.3 and 1.4 in the list in the 1st paragraph of section 8-1.02D(10).**

04-20-12

**Replace the last paragraph of section 8-1.04B with:**

10-19-12

The Department does not adjust time for starting before receiving notice of Contract approval.

**Replace the 1st paragraph of section 8-1.05 with:**

10-19-12

Contract time starts on the last day specified to start job site activities in section 8-1.04 or on the day you start job site activities, whichever occurs first.

**Replace the 2nd paragraph of section 8-1.05 with:**

10-19-12

Complete the work within the Contract time.

**Delete "unless the Contract is suspended for reasons unrelated to your performance" in the 4th paragraph of section 8-1.05.**

10-19-12

**Replace the headings and paragraphs in section 8-1.06 with:**

10-19-12

The Engineer may suspend work wholly or in part due to conditions unsuitable for work progress. Provide for public safety and a smooth and unobstructed passageway through the work zone during the suspension as specified under sections 7-1.03 and 7-1.04. Providing the passageway is force account work. The Department makes a time adjustment for the suspension due to a critical delay.

The Engineer may suspend work wholly or in part due to your failure to (1) fulfill the Engineer's orders, (2) fulfill a Contract part, or (3) perform weather-dependent work when conditions are favorable so that weather-related unsuitable conditions are avoided or do not occur. The Department may provide for a



**Add to the end of section 9-1.04A:**

10-19-12

For nonsubcontracted work paid by force account for a contract with a TRO bid item, the markups are those shown in the following table instead of those specified in sections 9-1.04B–D:

Cost	Percent markup
Labor	30
Materials	10
Equipment rental	10

**Delete ", Huntington Beach," in the 3rd paragraph of section 9-1.07A.**

04-20-12

**Replace the formula in section 9-1.07B(2) with:**

04-20-12

$$Qh = HMATT \times Xa$$

**Replace "weight of dry aggregate" in the definition of the variable  $Xa$  in section 9-1.07B(2) with:**

04-20-12

total weight of HMA

**Replace the formula in section 9-1.07B(3) with:**

04-20-12

$$Qrh = RHMATT \times 0.80 \times Xarb$$

**Replace "weight of dry aggregate" in the definition of the variable  $Xarb$  in section 9-1.07B(3) with:**

04-20-12

total weight of rubberized HMA

**Replace the heading of section 9-1.07B(4) with:**

04-20-12

**Hot Mix Asphalt with Modified Asphalt Binder**

**Add between "in" and "modified" in the introductory clause of section 9-1.07B(4):**

04-20-12

HMA with

**Replace the formula in section 9-1.07B(4) with:**

04-20-12

$$Qmh = MHMATT \times [(100 - Xam) / 100] \times Xmab$$

**Replace "weight of dry aggregate" in the definition of the variable  $Xmab$  in section 9-1.07B(4) with:**

04-20-12

total weight of HMA

**Replace the formula in section 9-1.07B(5) with:**

04-20-12

$$Qrap = HMATT \times Xaa$$

**Replace "weight of dry aggregate" in the definitions of the variables Xaa and Xfa in section 9-1.07B(5) with:**

04-20-12

total weight of HMA

**Add after the variable definitions in section 9-1.07B(9):**

04-20-12

The quantity of extender oil is included in the quantity of asphalt.

**Replace the headings and paragraphs in section 9-1.11 with:**

10-19-12

**9-1.11A General**

Section 9-1.11 applies if a bid item for time-related overhead is included in the Contract. If a bid item for time-related overhead is included, you must exclude the time-related overhead from every other bid item price.

**9-1.11B Payment Quantity**

The TRO quantity does not include the number of working days to complete plant establishment work.

For a contract with a TRO lump sum quantity on the Bid Item List, the Department pays you based on the following conversions:

1. LS unit of measure is replaced with WDAY
2. Lump sum quantity is replaced with the number of working days bid
3. Lump sum unit price is replaced with the item total divided by the number of working days bid

**9-1.11C Payment Inclusions**

Payment for the TRO bid item includes payment for time-related field- and home-office overhead for the time required to complete the work.

The field office overhead includes time-related expenses associated with the normal and recurring construction activities not directly attributed to the work, including:

1. Salaries, benefits, and equipment costs of:
  - 1.1. Project managers
  - 1.2. General superintendents
  - 1.3. Field office managers
  - 1.4. Field office staff assigned to the project
2. Rent
3. Utilities
4. Maintenance
5. Security
6. Supplies
7. Office equipment costs for the project's field office

The home-office overhead includes the fixed general and administrative expenses for operating your business, including:

1. General administration

2. Insurance
3. Personnel and subcontract administration
4. Purchasing
5. Accounting
6. Project engineering and estimating

Payment for the TRO bid item does not include payment for:

1. The home-office overhead expenses specifically related to:
  - 1.1. Your other contracts or other businesses
  - 1.2. Equipment coordination
  - 1.3. Material deliveries
  - 1.4. Consultant and legal fees
2. Non-time-related costs and expenses such as mobilization, licenses, permits, and other charges incurred once during the Contract
3. Additional overhead involved in incentive/disincentive provisions to satisfy an internal milestone or multiple calendar requirements
4. Additional overhead involved in performing additional work that is not a controlling activity
5. Overhead costs incurred by your subcontractors of any tier or suppliers

#### **9-1.11D Payment Schedule**

For progress payments, the total work completed for the TRO bid item is the number of working days shown for the pay period on the *Weekly Statement of Working Days*.

For progress payments, the Department pays a unit price equal to the lesser of the following amounts:

1. Price per working day as bid or as converted under section 9-1.11B.
2. 20 percent of the total bid divided by the number of original working days

For a contract without plant establishment work, the Department pays you the balance due of the TRO item total as specified in section 9-1.17B.

For a contract with plant establishment work, the Department pays you the balance due of the TRO item total in the 1st progress payment after all non-plant establishment work is completed.

#### **9-1.11E Payment Adjustments**

The 3rd paragraph of section 9-1.17C does not apply.

The Department does not adjust the unit price for an increase or decrease in the TRO quantity except as specified in section 9-1.11E.

Section 9-1.17D(2)(b) does not apply except as specified for the audit report below.

If the TRO bid item quantity exceeds 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B, the Engineer may adjust or you may request an adjustment of the unit price for the excess quantity. For the adjustment, submit an audit report within 60 days of the Engineer's request. The report must be prepared as specified for an audit report for an overhead claim in section 9-1.17D(2)(b).

Within 20 days of the Engineer's request, make your financial records available for an audit by the State for the purpose of verifying the actual rate of TRO described in your audit. The actual rate of TRO described is subject to the Engineer's authorization.

The Department pays the authorized actual rate for TRO in excess of 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B.

The Department pays for 1/2 the cost of the report; the Contractor pays for the other 1/2. The cost is determined under section 9-1.05.

**Replace the paragraphs of section 9-1.16D with:**

07-19-13

**9-1.16D(1) General**

Section 9-1.16D applies if a bid item for mobilization is shown on the Bid Item List.

Payments for mobilization made under section 9-1.16D are in addition to the partial payments made under Pub Cont Code § 10261.

Section 9-1.16D(2) applies unless the Contract includes a special provision for section 9-1.16D(1) that specifies section 9-1.16D(3) applies.

**9-1.16D(2) Mobilization for Projects Except for Those Over Water Requiring Marine Access**

11-15-13

The Department makes partial payments for mobilization under Pub Cont Code § 10264(a) except the amount of work completed does not include the amount earned for mobilization. The partial payment amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(a)(5).

07-19-13

The Department pays the item total for mobilization in excess of the maximum allowed under Pub Cont Code § 10264(a)(5) in the 1st payment after Contract acceptance.

**9-1.16D(3) Mobilization for Projects Over Water Requiring Marine Access**

The Department makes partial payments for mobilization under Pub Cont Code § 10264(b) except the amount of work completed does not include the amount earned for mobilization. The partial payment amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(b)(6).

The Department pays the item total for mobilization in excess of the maximum allowed under Pub Cont Code § 10264(b)(6) in the 1st payment after Contract acceptance.

**Delete "revised Contract" in item 1 of the 1st paragraph of section 9-1.16E(2).**

10-19-12

**Replace "2014" in the 1st paragraph of section 9-1.16F with:**

2020

10-19-12

**Replace the 2nd paragraph of section 9-1.17C with:**

Submit either a written acceptance of the proposed final estimate or a claim statement postmarked or hand delivered before the 31st day after receiving the proposed final estimate.

10-19-12

**Add between "the" and "final estimate" in the 1st sentence in the 3rd paragraph of section 9-1.17C:**

proposed

10-19-12

**Replace the 1st sentence in the 6th paragraph of section 9-1.17D(2)(b) with:**

The CPA's audit must be performed as an examination-level engagement under the attestation engagements in the *Government Auditing Standards* published by the Comptroller General of the United States.

07-19-13

AA

**DIVISION II GENERAL CONSTRUCTION**

**10 GENERAL**

04-19-13

Replace the headings and paragraphs in section 10 with:

04-19-13

**10-1 GENERAL**

**10-1.01 GENERAL**

Section 10 includes general specifications for general construction work.

**10-1.02 WORK SEQUENCING**

Before obliterating any traffic stripes, pavement markings, and pavement markers to be replaced at the same location, reference the stripes, markings, and markers. Include limits and transitions with control points to reestablish the new stripes, markings, and markers.

**10-1.03 TIME CONSTRAINTS**

Reserved

**10-1.04 TRAINING AND MEETINGS**

Training and meetings are held at times and locations you and the Engineer agree to.

**10-1.05–10-1.10 RESERVED**

**10-2 SUSTAINABLE DESIGN REQUIREMENTS**

**10-2.01 GENERAL**

**10-2.01A General**

Reserved

**10-2.01B–10-2.01H Reserved**

**10-2.02 CALGREEN TIER 1**

**10-2.02A–10-2.02H Reserved**

**10-2.03 LEED**

**10-2.03A–10-2.03H Reserved**

**10-3–10-5 RESERVED**

**10-6 JOB SITE WATER CONTROL**

**10-6.01 GENERAL**

Section 10-6 includes specifications for controlling water to provide a dry working area at the job site.

**10-6.02 WATER-FILLED COFFERDAM**

Reserved

**10-6.03–10-6.10 RESERVED**

**10-7–10-20 RESERVED**

AA

# 11 QUALITY CONTROL AND ASSURANCE

07-19-13

Replace section 11-2 with:

07-19-13

**11-2 RESERVED**

Replace the table in the 3rd paragraph of section 11-3.01A with:

07-19-13

AWS code	Year of adoption
D1.1	2010
D1.3	2008
D1.4	2011
D1.5	2010
D1.6	2007
D1.8	2009

Replace "does" in the definition of "continuous inspection" in section 11-3.01B with:

07-19-13

do

Replace "gross nonconformance" and its definition in section 11-3.01B with:

07-19-13

**gross nonconformance:** Rejectable indications are present in more than 20 percent of the tested weld length.

Replace the introductory clause in the 1st paragraph of section 11-3.01C with:

07-19-13

Replace clause 6.1.3 of AWS D1.1, the 1st paragraph of clause 7.1.2 of AWS D1.4, and clause 6.1.2 of AWS D1.5 with:

Replace the 3rd paragraph of section 11-3.01C with:

07-19-13

For each inspection, including fit-up, WPS verification, and final weld inspection, the QC Inspector must confirm and document compliance with the specifications, AWS welding codes, and any referenced drawings.

Replace the paragraphs in section 11-3.01D with:

07-19-13

The Engineer has the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means determined by the Engineer. If welding will be performed without gas shielding, then qualification must also include welding without gas shielding.

Replace clause 6.14.6.1 of AWS D1.1, clause 7.8 of AWS D1.4, and clause 6.1.3.4 of AWS D1.5 with:

Personnel performing NDT must be qualified and certified under American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the written practice of the NDT firm. The written practice of the NDT firm must comply with or exceed the guidelines of the ASNT

Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports must be one of the following:

1. Certified NDT Level II technicians
2. Level III technicians certified to perform the work of Level II technicians

**Replace the heading and the 1st through 3rd paragraphs of section 11-3.01E with:**

07-19-13

**11-3.01E Weld Joint Details**

If weld joint details proposed for use in the work are not prequalified under clause 3 of AWS D1.1 or figure 2.4 or 2.5 of AWS D1.5, submit the proposed WPS and the intended weld joint locations.

Upon authorization of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details must weld an additional qualification test plate using the WPS variables and the weld joint detail to be used in production. The test plate must:

1. Have the maximum thickness to be used in production and a minimum length of 18 inches.
2. Be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria must comply with the applicable AWS codes.

If a nonprequalified weld joint configuration is proposed using a combination of WPSs for work welded under AWS D1.1, you may conduct a single test combining the WPSs to be used in production, if the essential variables, including weld bead placement, of each process are limited to those established in table 4.5 of AWS D1.1.

**Replace the 1st paragraph of section 11-3.01F with:**

07-19-13

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

3. If indications that exhibit these planar characteristics are present at scanning sensitivity, or other evidence exists to suggest the presence of transverse cracks, a more detailed evaluation of the discontinuity by other means must be performed (e.g., alternate UT techniques, RT, grinding, or gouging for visual inspection or MT of the excavated areas.). For welds that have transverse cracks, excavate the full length of the crack plus 2 inches of weld metal on each side adjacent to the crack and reweld.

**Replace "section" in the 2nd paragraph of section 11-3.01F with:**

07-19-13

clause

**Replace the 1st paragraph of section 11-3.02A with:**

07-19-13

Except for stud welding, section 11-3.02 applies to (1) work welded under sections 49, 52, 55, and 75-1.03E and (2) work in section 99 that must comply with an AWS welding code.

**Replace the 4th through 6th paragraphs of section 11-3.02C(2) with:**

07-19-13

Submit an amended welding QC plan or an addendum to the welding QC plan for any changes to:

1. WPSs
2. NDT firms
3. QC personnel or procedures

4. NDT personnel or procedures
5. Systems for tracking and identifying welds
6. Welding personnel

Allow 15 days for the Engineer's review of an amended welding QC plan or an addendum to the welding QC plan.

Submit 7 copies of each authorized QC plan and any authorized addendums. Make 1 copy available at each location where work is performed.

**Replace the 1st paragraph of section 11-3.02C(3) with:**

07-19-13

Submit a welding report within 7 days following the performance of any welding. The welding report must include:

1. Daily production log for welding for each day that welding is performed
2. Reports of all visual weld inspections and NDT performed, whether specified, additional, or informational
3. Radiographs and radiographic reports, and other required NDT reports
4. Summary of welding and NDT activities that occurred during the reporting period
5. Reports of each application of heat straightening
6. Summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number
7. Documentation that you have:
  - 7.1. Evaluated all radiographs and radiograph reports and NDT and NDT reports
  - 7.2. Corrected all rejectable deficiencies and that all repaired welds have been reexamined using the required NDT and found acceptable
8. Reports or chart recordings of each application of any stress relieving used
9. Reports and chart recordings for any electroslag welding used

**Add between "radiographic" and "envelopes" in the introductory clause in the 3rd paragraph of section 11-3.02C(3):**

07-19-13

film

**Delete the 3rd sentence in the 5th paragraph of section 11-3.02C(3).**

07-19-13

**Replace the introductory clause in the 1st paragraph of section 11-3.02D with:**

07-19-13

Clauses 6.1.4.1 and 6.1.4.3 of AWS D1.1, the 2nd paragraph of clause 7.1.2 of AWS D1.4, clauses 6.1.3.1 through 6.1.3.3 of AWS D1.5, and clause 7.2.3 of AWS D1.8 are replaced with:

**Replace items 1 and 2 in the list in the 2nd paragraph of section 11-3.02D with:**

07-19-13

1. Work is welded at a permanent fabrication or manufacturing plant that is certified under the AISC Certification Program for Steel Bridge Fabricators, Intermediate Bridges, and Fracture-Critical Member endorsement if required.
2. Structural steel for building construction work is performed at a permanent fabrication or manufacturing plant that is certified under the AISC Quality Certification Program, Category STD, Standard for Steel Building Structures.



**Replace "project" in the 4th paragraph of section 12-3.02C with:**

10-19-12

work

**Add after "Display" in item 4 in the list in the 2nd paragraph of section 12-3.03B:**

04-19-13

or Alternating Diamond

**Replace "project" in the 3rd paragraph of section 12-3.07C with:**

10-19-12

work

**Add to section 12-3:**

07-19-13

**12-3.18 AUTOMATED WORK ZONE INFORMATION SYSTEM**

Reserved

**12-3.19–12-3.25 RESERVED**

**Replace the 7th through 9th paragraphs of section 12-4.02A with:**

07-19-13

If pedestrian traffic is allowed to pass through construction areas, provide a temporary pedestrian facility through the construction areas within the highway. Include protective overhead covering as necessary to ensure protection from falling objects and drippings from overhead structures.

At locations where pedestrian openings through falsework are required, provide a temporary pedestrian facility with protective overhead covering during all bridge construction activities.

Temporary pedestrian facilities must comply with section 12-7.

If an activity requires a closure of a walkway, another walkway must be made available nearby, off of the traveled way.

07-19-13

**Delete the 12th paragraph of section 12-4.02A.**

**Replace section 12-4.03 with:**

07-19-13

**12-4.03 CLOSURE SCHEDULES AND CONDITIONS**

**12-4.03A General**

Submit closure schedule requests and closure schedule amendments using LCS to show the locations and times of the requested closures.

The Department provides LCS training. Request the LCS training at least 30 days before submitting the 1st lane closure request. The Department provides the training within 15 days after your request. The training may be web based.

Except for web-based training, the training is held at a time and location you and the Engineer agree to.

For web-based training, the Engineer provides you the website address to access the training.

Within 5 business days after completion of the training, the Department provides LCS accounts and user identifications to your assigned, trained representatives.

Each representative must maintain a unique password and current user information in the LCS.

#### **12-4.03B Closure Schedules**

Every Monday by noon, submit a closure schedule request of planned closures for the next week period. The next week period is defined as Sunday noon through the following Sunday noon.

Submit a closure schedule request not less than 25 days and not more than 125 days before the anticipated start of any activity that reduces:

1. Horizontal clearances of traveled ways, including shoulders, to 2 lanes or less due to activities such as temporary barrier placement and paving
2. Vertical clearances of traveled way, including shoulders, due to activities such as pavement overlays, overhead sign installation, falsework, or girder erection

Submit closure schedule amendments, including adding additional closures, by noon at least 3 business days before a planned closure.

Cancel closure requests using LCS at least 48 hours before the start time of the closure.

You will be notified through LCS of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

The Engineer may reschedule a closure cancelled due to unsuitable weather.

If a closure is not opened to traffic by the specified time, suspend work. No further closures are allowed until the Engineer has reviewed and authorized a work plan submitted by you that ensures that future closures will be opened to traffic by the specified time. Allow 2 business days for review of your proposed work plan. The Department does not compensate you for your losses due to the suspension of work resulting from the late opening of closures.

Notify the Engineer of delays in your activities caused by:

1. Your closure schedule request being denied although your requested closures are within the specified time frame allowed for closures. The Department does not compensate you for your losses due to amendments to the closure schedule that are not authorized.
2. Your authorized closure being denied.

If you are directed to remove a closure before the time designated in the authorized closure schedule, you will be compensated for the delay.

#### **12-4.03C Contingency Plan**

Section 12-4.03C applies if a contingency plan is specified in the special provisions or if a contingency plan is requested.

If a contingency plan is requested, submit the contingency plan within 1 business day of the request.

The contingency plan must identify the activities, equipment, processes, and materials that may cause a delay in the opening of a closure to traffic. The plan must include:

1. List of additional or alternate equipment, materials, or workers necessary to ensure continuing activities and on-time opening of closures if a problem occurs. If the additional or alternate equipment, materials, or workers are not on site, specify their location, the method for mobilizing these items, and the required time to complete mobilization.
2. General time-scaled logic diagram displaying the major activities and sequence of planned operations. For each activity, identify the critical event when the contingency plan will be activated.

Based on the Engineer's review, additional materials, equipment, workers, or time to complete activities from that specified in the contingency plan may be required.



**Add to section 13-1.01A:**

11-15-13

Comply with the Department's general permit issued by the State Water Resources Control Board for *Order No. 2012-0011-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans)*. The Department's general permit governs stormwater and nonstormwater discharges from the Department's properties, facilities, and activities. The Department's general permit may be viewed at the Web site for the State Water Resources Control Board, Storm Water Program, Caltrans General Permit.

**Add to the list in the 1st paragraph of section 13-1.01D(3)(b):**

10-21-11

3. Have completed SWRCB approved QSD training and passed the QSD exam

**Add to the list in the 2nd paragraph of section 13-1.01D(3)(b):**

10-21-11

3. Have completed SWRCB approved QSP training and passed the QSP exam

**Replace "NEL violation" in item 3.6.2 in the list in the 1st paragraph of section 13-1.01D(3)(c) with:**

04-19-13

receiving water monitoring trigger

**Replace the 1st paragraph in section 13-2.01B with:**

04-19-13

Within 7 days after Contract approval, submit 2 copies of your WPCP for review. Allow 5 business days for review.

After the Engineer authorizes the WPCP, submit an electronic copy and 3 printed copies of the authorized WPCP.

If the RWQCB requires review of the authorized WPCP, the Engineer submits the authorized WPCP to the RWQCB for its review and comment. If the Engineer orders changes to the WPCP based on the RWQCB's comments, amend the WPCP within 3 business days.

**Replace the 1st paragraph in section 13-3.01B(2)(a) with:**

04-19-13

Within 15 days of Contract approval, submit 3 copies of your SWPPP for review. The Engineer provides comments and specifies the date when the review stopped if revisions are required. Change and resubmit a revised SWPPP within 15 days of receiving the Engineer's comments. The Department's review resumes when a complete SWPPP has been resubmitted.

When the Engineer authorizes the SWPPP, submit an electronic copy and 4 printed copies of the authorized SWPPP.

If the RWQCB requires review of the authorized SWPPP, the Engineer submits the authorized SWPPP to the RWQCB for its review and comment. If the Engineer requests changes to the SWPPP based on the RWQCB's comments, amend the SWPPP within 10 days.

**Replace "NELs" in item 3.1 in the 3rd paragraph of section 13-3.01B(2)(a) with:**

04-19-13

receiving water monitoring triggers

**Replace section 13-3.01B(6)(c) with:**

04-19-13

**13-3.01B(6)(c) Receiving Water Monitoring Trigger Report**

Whenever a receiving water monitoring trigger is exceeded, notify the Engineer and submit a receiving water monitoring trigger report within 48 hours after conclusion of a storm event. The report must include:

1. Field sampling results and inspections, including:
  - 1.1. Analytical methods, reporting units, and detection limits
  - 1.2. Date, location, time of sampling, visual observation and measurements
  - 1.3. Quantity of precipitation from the storm event
2. Description of BMPs and corrective actions

**Replace "NEL" in the 6th paragraph of section 13-3.01C(1) with:**

04-19-13

receiving water monitoring trigger

**Replace section 13-3.01C(3) with:**

04-19-13

**13-3.01C(3) Receiving Water Monitoring Trigger**

For a risk level 3 project, receiving water monitoring triggers must comply with the values shown in the following table:

**Receiving Water Monitoring Trigger**

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Lower limit = 6.0 Upper limit = 9.0
Turbidity	Field test with calibrated portable instrument	1	NTU	500 NTU max

The storm event daily average for storms up to the 5-year, 24-hour storm must not exceed the receiving water monitoring trigger for turbidity.

The daily average sampling results must not exceed the receiving water monitoring trigger for pH.

04-19-13

**Delete "and NELs are violated" in the 3rd paragraph of section 13-3.03C.**

**Replace "working days" at each occurrence in section 13-3.04 with.**

10-19-12

original working days

**Delete the 1st sentence in the 2nd paragraph of section 13-4.03C(3).**

04-19-13

**Add between the 2nd and 3rd paragraphs of section 13-4.03C(3):**

04-19-13

Manage stockpiles by implementing water pollution control practices on:

1. Active stockpiles before a forecasted storm event
2. Inactive stockpiles according to the WPCP or SWPPP schedule

**Replace the paragraph in section 13-4.04 with:**

04-20-12

Not Used

**Replace "20-7.02D(6)" in section 13-5.02C with:**

07-19-13

20-5.03E

**Delete "or stockpile" in the 3rd paragraph of section 13-5.02F.**

10-19-12

**Replace "20-7.03I(10)" in section 13-5.03C with:**

07-19-13

20-5.03E(3)

**Replace section 13-5.03F with:**

04-20-12

**13-5.03F Reserved**

**Delete "or stockpile" in item 1 in the list in the 1st paragraph of section 13-5.03K.**

10-19-12

**Delete the 3rd paragraph of section 13-5.03K.**

10-19-12

**Replace the 2nd sentence in the 1st paragraph of section 13-9.01A with:**

10-19-12

You may use any of the following systems for temporary concrete washout:

1. Temporary concrete washout facility
2. Portable temporary concrete washout
3. Temporary concrete washout bin

**Replace the 2nd paragraph of section 13-9.01B with:**

10-19-12

Retain and submit an informational submittal for records of disposed concrete waste.



**15-2.02B(5)(b) Saw Cuts**

Saw cut using a diamond blade and make cuts perpendicular to the pavement surface. Saw cutting is not required where concrete pavement is adjacent to asphalt concrete pavement.

Saw cut (1) no more than 2 days before removing pavement and (2) such that traffic will not dislodge any pavement piece or segment. Saw cut perpendicular to the traveled way except you may cut parallel or diagonal to the traveled way when removing the pavement during the same lane closure as the saw cutting.

You may make additional saw cuts within the sawed outline.

Saw cuts must be the full depth of the pavement unless otherwise shown.

Saw cut at longitudinal and transverse joints to remove entire slabs. For partial-slab areas, the Engineer determines the exact saw-cut locations.

**15-2.02B(5)(c) Reserved**

**15-2.02B(6) Reserved**

**15-2.02B(7) Payment**

Reserved

**Replace section 15-2.02G with:**

07-19-13

**15-2.02G Remove Guardrail**

Where removing guardrail, remove any concrete anchors and steel foundation tubes.

**Replace the 1st paragraph of section 15-2.02K with:**

07-19-13

Box culverts, concrete pipes, inlets, headwalls, and endwalls must be completely removed if any portion of these structures is (1) within 3 feet of the grading plane in excavation areas, (2) within 1 foot of original ground in embankment areas, or (3) shown to be removed.

**Replace "Metal beam guard railing" in the table in the 2nd paragraph of section 15-2.03A(2)(a) with:**

07-19-13

Guardrail

**Replace the heading of section 15-2.03B with:**

07-19-13

**Salvage Guardrail**

**Replace the heading of section 15-2.04D with:**

07-19-13

**Reconstruct Guardrail**

**Replace section 15-2.09D with:**

07-19-13

**15-2.09D Reserved**

**Replace the 4th paragraph of section 15-2.10B with:**

01-18-13

Instead of using new materials similar in character to those in the existing structure, you may use raising devices to adjust a manhole to grade. Before starting paving work, measure and fabricate raising devices. Raising devices must:

1. Comply with the specifications for section 75 except that galvanizing is not required
2. Have a shape and size that matches the existing frame
3. Be match marked by painting identification numbers on the device and corresponding structure
4. Result in an installation that is equal to or better than the existing one in stability, support, and nonrocking characteristics
5. Be fastened securely to the existing frame without projections above the surface of the road or into the clear opening

**Replace the heading of section 15-2.10D with:**

07-19-13

**Adjust Guardrail**

**Replace the paragraphs of section 15-3.01 with:**

07-19-13

Section 15-3 includes specifications for removing all or a portion of a concrete facility.

Concrete facilities include curbs, gutters, gutter depressions, sidewalks, driveways, slope paving, island paving, barriers, retaining walls, sound walls, minor structures, aprons, spillways, and dams.

Where broken-concrete slope protection is shown, use removed concrete for the construction of the broken-concrete slope protection.

Instead of disposing of removed concrete by removing it from the job site, you may dispose of it on the job site by one of the following methods:

1. Burying it in embankments at authorized locations. Removed concrete must be broken into pieces that can be readily handled and incorporated into embankments and placed at a depth of at least 3 feet below finished grade and slope lines. Concrete must not be buried in areas where piling is to be placed or within 10 feet of trees, pipelines, poles, buildings or other permanent objects or structures.
2. Placing it at authorized locations. The removed concrete must not present an unsightly appearance from the highway.

**Replace the paragraph of section 15-3.02 with:**

07-19-13

Not Used

**Delete the 5th paragraph of section 15-3.03.**

07-19-13

**Add to the end of section 15-4.01A(2):**

04-19-13

Allow 20 days for review of the bridge removal work plan.

**Replace the 1st paragraph of section 15-5.01C(1) with:**

10-19-12

Before starting deck rehabilitation activities, complete the removal of any traffic stripes, pavement markings, and pavement markers.

**Replace the 2nd and 3rd paragraphs of section 15-5.01C(2) with:**

10-19-12

Perform the following activities in the order listed:

1. Abrasive blast the deck surface with steel shot. Perform abrasive blasting after the removal of any unsound concrete and placement of any rapid setting concrete patches.
2. Sweep the deck surface.
3. Blow the deck surface clean using high-pressure air.

**Replace the 2nd paragraph of section 15-5.01C(4) with:**

10-19-12

Before removing asphalt concrete surfacing, verify the depth of the surfacing at the supports and midspans of each structure (1) in each shoulder, (2) in the traveled way, and (3) at the roadway crown, if a crown is present.

**Delete "and concrete expansion dams" in the 3rd paragraph of section 15-5.01C(4).**

04-19-13

**Replace the 2nd paragraph of section 15-5.03A(2) with:**

10-19-12

For a contract with less than 60 original working days, submit certificates of compliance for the filler material and bonding agents.

**Replace "51-1.02C" in the 1st paragraph of section 15-5.03B with:**

04-19-13

51-1.02F

**Replace the 4th paragraph of section 15-5.03B with:**

10-19-12

For a contract with less than 60 original working days, alternative materials must be authorized before use.

**Add between the 5th and 6th paragraphs of section 15-5.03C:**

10-19-12

The final surface finish of the patched concrete surface must comply with section 51-1.03F.

**Delete the 4th paragraph of section 15-5.05C.**

10-19-12

**Replace "51-1.03F(5)" in the 3rd paragraph of section 15-5.06C(1) with:**

51-1.01D(4)(b)

07-19-13

**Replace "51-1.03E(5)" in the 5th paragraph of section 15-5.06C(1) with:**

51-1.03F(5)

10-19-12

**Delete the 9th paragraph of section 15-5.06C(1).**

10-19-12

**Delete the 15th paragraph of section 15-5.06C(1).**

04-19-13

**Add between the 18th and 19th paragraphs of section 15-5.06C(1):**

Texture the polyester concrete surface before gelling occurs by longitudinal tining under 51-1.03F(5)(b)(iii), except do not perform initial texturing.

07-19-13

**Replace section 15-5.06C(2) with:**

**15-5.06C(2) Reserved**

04-19-13

**Delete the 3rd paragraph of section 15-5.06D.**

04-19-13

**Replace the 1st paragraph in section 15-5.07B(4) with:**

Payment for furnishing dowels is not included in the payment for core and pressure grout dowel.

10-19-12

**Replace section 15-5.09 with:**

04-19-13

**15-5.09 POLYESTER CONCRETE EXPANSION DAMS**

**15-5.09A General**

Section 15-5.09 includes specifications for constructing polyester concrete expansion dams.

Polyester concrete expansion dams must comply with the specifications for polyester concrete overlays in section 15-5.06, except a trial slab is not required.

Reinforcement must comply with section 52.

**15-5.09B Materials**

Not Used

**15-5.09C Construction**

For new asphalt concrete overlays, place the asphalt concrete overlay before starting polyester concrete activities. Saw cut and remove asphalt concrete at expansion dam locations.

For existing asphalt concrete overlays, remove expansion dams and asphalt concrete to the limits shown. Removing expansion dams must comply with section 15-4 except a bridge removal work plan is not required.

Where a portion of the asphalt concrete overlay is to remain, saw cut a 2-inch-deep neat line along the edge to remain in place before removing the asphalt concrete. Do not damage the existing surfacing to remain in place.

Prepare the deck surface under section 15-5.01C(2).

You may use a mechanical mixer to mix the polyester concrete for expansion dams. The mixer capacity must not exceed 9 cu ft unless authorized. Initiate the resin and thoroughly blend it immediately before mixing it with the aggregate. Mix the polyester concrete for at least 2 minutes before placing.

The application rate of methacrylate resin must be approximately 100 sq ft/gal.

You may place and finish expansion dams using hand methods.

Protect expansion dams from moisture, traffic, and equipment for at least 4 hours after finishing.

For expansion dams over 6 feet long, install 1/4-inch-wide joint material at 6-foot intervals across the width of the expansion dam. Joint material must be either expanded polyurethane or expanded polyethylene.

**15-5.09D Payment**

Not Used

**Add to section 15-6.01A(3)(a):**

07-19-13

Within 5 days of completing annular space grouting at a culvert, submit the grouting records.

**Replace "41-1.01" in item 10.3 in the list in the 2nd paragraph of section 15-6.01A(3)(d) with:**

07-19-13

41-2

**Replace "41-1.02" in 1st paragraph of section 15-6.01B(2) with:**

07-19-13

41-2

**Replace the heading of section 15-6.04 with:**

01-18-13

**INVERT PAVING**

**Replace the 1st paragraph of section 15-6.13A(1) with:**

07-19-13

Section 15-6.13 includes specifications for installing machine spiral wound PVC pipeliners directly into the culvert.

**Replace the heading of section 15-6.13B with:**

07-19-13

**Machine Spiral Wound PVC Pipeliners, Grouted**



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 "90" in the paragraph of section 19-3.02G with:**

90-1

01-18-13

**Add to section 19-3.02:**

**19-3.02I Filter Fabric**

Filter fabric must be Class A.

07-19-13

**Replace the heading of section 19-3.03C with:**

**19-3.03B(4) Cofferdams**

04-19-13

**Replace the heading of section 19-3.03D with:**

**19-3.03B(5) Water Control and Foundation Treatment**

04-19-13

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

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

01-20-12

**Add to the end of section 19-3.03E(3):**

If filter fabric is shown behind the lagging:

07-19-13

1. Immediately before placing the filter fabric, remove any loose or extraneous material and sharp objects from the surface to receive the filter fabric.
2. Handle and place the filter fabric under the manufacturer's instructions. Stretch, align, and place the fabric without wrinkling.
3. Stitch the adjacent borders of filter fabric or overlap the adjacent borders by 12 to 18 inches. If stitching the border, use yarn of a contrasting color. Yarn size and composition must be as recommended by the fabric manufacturer. Use 5 to 7 stitches per inch of seam.
4. Repair any damaged filter fabric by placing a piece of filter fabric large enough to cover the damaged area and comply with the overlapping or stitching requirements.

**Replace the 2nd paragraph of section 19-3.03F with:**

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.

01-20-12

**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.

**Replace the 9th paragraph of section 19-3.03K:**

01-20-12

Do not excavate to the next underlying excavation lift until the following conditions have been attained for the portion of the soil nail or ground anchor wall in the current excavation lift:

1. Soil nails or ground anchors are installed and grouted.
2. Reinforced shotcrete facing is constructed.
3. Grout and shotcrete have cured for at least 72 hours.
4. Specified tests are complete for that portion of wall and the results are authorized.
5. Soil nail facing anchorages are attached or ground anchors are locked off.

01-18-13

01-20-12

**Replace the 2nd sentence in the 7th paragraph of section 19-3.04 with:**

01-18-13

Structure excavation more than 0.5 foot from the depth shown is paid for as a work-character change if you request an adjustment or the Engineer orders an adjustment.

**Replace "Contract completion time" in the 8th paragraph of section 19-6.03D with:**

10-19-12

work completion date

**Add to section 19:**

01-18-13

**19-10-19-20 RESERVED**

AA

## 20 LANDSCAPE

11-15-13

Replace the headings and paragraphs in section 20 with:

07-19-13

### 20-1 GENERAL

#### 20-1.01 GENERAL

##### 20-1.01A Summary

Section 20-1 includes general specifications for performing landscaping.

If an irrigation system is to be installed in an existing planting area to be maintained, check for plant deficiencies under section 20-3.02A(4) before starting irrigation work.

Perform a functional test for each irrigation system under 20-2.01A(4)(d):

1. Before planting the plants
2. After planting the plants
3. Before the start of the plant establishment work

If a plant is to be transplanted or an irrigation component is to be relocated, transplant plant or protect irrigation components before performing other construction activities in the area.

Perform roadside clearing:

1. As required to prepare the job site for construction work
2. Until the start of the plant establishment work or Contract acceptance, whichever comes first

##### 20-1.01B Definitions

Reserved

##### 20-1.01C Submittals

At least 15 days before applying any pesticide, submit a copy of the licensed pest control adviser's recommendation.

At the end of each week, submit a report documenting the application of all pesticides as an informational submittal. Use form *Report of Chemical Spray Operations*.

Before mixing a pesticide, submit a copy of the registered label for the pesticide as an informational submittal. If unable to copy, allow the Engineer to read the label on the container.

##### 20-1.01D Quality Control and Assurance

###### 20-1.01D(1) General

Obtain a recommendation from a licensed pest control adviser for the use of all pesticides under the Food & Agri Code. The recommendation must include the pesticides to be used, rates of application, methods of application, and application areas.

The pesticide applicator must have an active and valid qualified applicator license or certificate from the Department of Pesticide Regulation.

###### 20-1.01D(2) Progress Inspections

The Engineer will perform progress inspections before:

1. Cultivating work starts
2. Pressure testing of irrigation pipe on the supply side of control valves
3. Testing of low voltage conductors
4. Planting work starts
5. Completion of planting work

Notify the Engineer at least 4 business days before each inspection is required. Allow at least 3 business days for the Engineer's inspection.

Unless otherwise authorized, do not proceed with the next construction activity until the inspection has been completed and any required corrective work has been performed and authorized.

## **20-1.02 MATERIALS**

### **20-1.02A General**

Reserved

### **20-1.02B Water**

Water available from an existing Department-owned facility within the project limits or an irrigation system to be installed under the Contract is furnished at no charge.

If water is not available, make arrangements for supplying water. Water must be of a quality that will promote plant growth.

### **20-1.02C Pesticides**

Pesticides must comply with the Department of Pesticide Regulation.

Insecticide must be imidacloprid.

Rodenticides must be brodifacoum, bromadiolone, or diphacinone.

Do not use oil or pelleted forms of pesticides for weed control.

For weed control, use a pesticide with a photosensitive dye that produces a contrasting color when sprayed on the ground. The color must disappear between 2 to 3 days after being applied. The dye must not stain surfaces or injure plants or wildlife when applied at the manufacturer's recommended application rate.

## **20-1.03 CONSTRUCTION**

### **20-1.03A General**

Take precautions to prevent irrigation water from:

1. Wetting vehicles, pedestrians, and pavement
2. Eroding soil

Dispose of removed, pruned, and damaged vegetative material.

You may reduce removed vegetative material to chips with a maximum thickness of 1/2 inch and spread within the job site at locations determined by the Engineer. Chipped material must not be substituted for wood mulch, nor must the chipped material be placed within areas to receive wood mulch.

### **20-1.03B Pesticides**

Notify the Engineer of pesticide application times at least 24 hours before each application.

Mix and apply pesticides under the requirements of the Department of Pesticide Regulation and the instructions on the pesticide product label.

Do not apply pesticides:

1. On Saturdays and holidays unless authorized
2. Whenever weather and wind conditions are unsuitable for application
3. Within the plant basin
4. On the foliage and woody parts of the plant

If a granular preemergent is used, it must be covered with mulch on the same work day. Do not apply granular preemergent in plant basins.

Do not apply preemergents:

1. To groundcover plants before the plants have been planted a minimum of 3 days and have been thoroughly watered
2. Within 18 inches of trees, shrubs, and seeded areas

### **20-1.03C Roadside Clearing**

#### **20-1.03C(1) General**

Perform roadside clearing by:

1. Removing and disposing of trash and debris
2. Controlling the following pests:
  - 2.1. Rodents
  - 2.2. Insects
  - 2.3. Weeds
3. Removing existing plants as described

Control rodents by using rodenticides or traps.

#### **20-1.03C(2) Remove Existing Plants**

Remove existing plants as described. Removal of existing plants includes removing their stumps and roots 2 inches or larger in diameter to a minimum depth of 12 inches below finished grade. Backfill holes resulting from stump removal to finished grade with material obtained from adjacent areas.

If a plant is to be planted within existing groundcover area, remove existing groundcover from within an area 6 feet in diameter centered at each plant location.

#### **20-1.03C(3) Weed Control**

Control weeds by the use of pesticides, hand pulling, or mowing.

If pesticides are used to control weeds, apply pesticides before the weeds reach the seed stage of growth or exceed 4 inches in length, whichever occurs first. Do not use pesticides at cutting plant locations.

Where cuttings are to be planted, control weeds by hand pulling within an area 2 feet in diameter centered at each plant location.

If weeds are to be controlled by hand pulling, hand pull weeds before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs first.

Where liner, plug, or seedling plants are to be planted 10 feet or more apart, control weeds by the use of pesticides or hand pulling within an area 2 feet in diameter centered at each plant location. Where liner, plug, or seedling plants are to be planted less than 10 feet apart, control weeds by the use of pesticides within the entire area.

Control weeds by mowing outside of mulched areas, plant basins, groundcover areas, and within areas to be seeded. Mowing must extend to the edges of pavement, dikes, curbs, sidewalks, walls, and fences.

If mowing is to be performed within areas to be seeded, perform mowing as needed until the start of the seeding operation specified in section 21.

Mowing must be performed before the weeds reach the seed stage of growth or exceed 6 inches in length, whichever occurs first. Mow weeds to a height of 3 inches.

#### **20-1.03C(4) Disposal of Removed Groundcover, Weeds, and Mowed Material**

Dispose of hand pulled weeds the same day they are pulled. Dispose of removed groundcover within 3 days.

Dispose of mowed material from the initial mowing. Disposal of material from subsequent mowing is not required.

### **20-1.03D Cultivation**

Cultivation must be by mechanical methods and performed until the soil is in a loose condition to a minimum depth of 6 inches. Soil clods must not be larger than 2 inches in maximum dimension after cultivation.

The areas to be cultivated must extend 12 inches beyond the outer limit of each planting area requiring cultivation.

After initial cultivation, place soil amendment and fertilizer at specified rates.

Recultivate to thoroughly mix native soil and amendments.

Do not drive on cultivated areas after cultivation.

Planting areas that have been cultivated and become compacted must be recultivated.

Rocks and debris encountered during soil preparation in planting areas must be brought to the surface of the ground.

Remove rocks and debris as ordered. This work is change order work.

### **20-1.03E Weed Germination**

Reserved

### **20-1.04 PAYMENT**

Items paid for by area are measured parallel to the ground surface.

Planting areas that do not require cultivation but are within the cultivation areas will not be deducted.

## **20-2 IRRIGATION**

### **20-2.01 GENERAL**

#### **20-2.01A General**

##### **20-2.01A(1) Summary**

Section 20-2 includes specifications for installing irrigation systems.

The irrigation systems shown are diagrammatic.

##### **20-2.01A(2) Definitions**

Reserved

##### **20-2.01A(3) Submittals**

###### **20-2.01A(3)(a) General**

Submit shop drawings for the electrical components of the irrigation system except electrical service 30 days before installation. The drawings must:

1. Include schematic wiring diagrams showing wire sizes and routes between electrical components
2. Show conduit sizes
3. Bear the written approval of the controller manufacturer or the manufacturer's authorized agent
4. Be accompanied by:
  - 4.1. Colored wire and splice samples
  - 4.2. Manufacturer's descriptive and technical literature

After the work shown on the drawing is complete, submit 3 copies of the as-built shop drawings including any wire modifications for each controller installed.

For each controller, laminate and place in an envelope 1 copy of:

1. As-built schematic wiring diagram including wiring modifications
2. 11 by 17 inches as-built irrigation plan

The laminate must be clear, mat-finished plastic that is at least 10 mils thick. The envelope must be heavy-duty plastic.

Attach the envelope to the inside of the controller enclosure or cabinet door. If the door is not large enough to secure the envelope, submit the envelope and its contents.

**20-2.01A(3)(b) Manufacturer's Instructions**

Submit as an informational submittal the manufacturer's installation instructions 15 days before installing:

1. Couplings for conduits used for irrigation conduits
2. Plastic pipe and fittings
3. Solvent cement for plastic pipe and flexible hose
4. Sprinklers
5. Flow sensors

**20-2.01A(3)(c) Maintenance and Operation Manuals**

Before Contract acceptance, submit as an informational submittal a manufacturer's maintenance and operation manual for each type of controller installed.

**20-2.01A(4) Quality Control and Assurance****20-2.01A(4)(a) General**

Reserved

**20-2.01A(4)(b) Pressure Testing****20-2.01A(4)(b)(i) General**

Perform pressure testing for leakage on irrigation supply lines:

1. In the Engineer's presence
2. On business days between 8 a.m. and 5 p.m. unless authorized
3. Before backfilling supply line trenches
4. With irrigation system gate valves open
5. With open ends of the supply line and fittings plugged or capped

Notify the Engineer at least 48 hours before performing a pressure test.

Choose either Method A or B to test supply lines installed by trenching and backfilling and supply lines that are completely visible after installation.

All other supply lines, including those installed in the ground by methods other than trenching and backfilling must be tested by Method A.

Test irrigation supply line in conduit by Method A with the testing period modified to 0.5 hour and no allowable pressure drop.

**20-2.01A(4)(b)(ii) Method A**

Method A pressure testing procedures for leakage must comply with the following:

1. Pressure gauge must be calibrated from 0 to 200 psi in 5 psi increments and be accurate to within a tolerance of 2 psi.
2. Supply line must be filled with water and connected to a pressure gauge. Place the pipeline under a pressure of 125 psi. Remove the source of pressure and leave the line under the required pressure.
3. Test the supply line under the required pressure for a period of 1 hour. The pressure gauge must remain in place until each test period is complete.
4. Leaks that develop in the tested portion of the system must be located and repaired after each test period if a drop of more than 5 psi is indicated by the pressure gauge. After the leaks have been repaired, repeat the 1 hour pressure test until the drop in pressure is 5 psi or less.

If a system consists of a new supply line connected to an existing line, the new supply line must be isolated from the existing line and tested.

**20-2.01A(4)(b)(iii) Method B**

Method B pressure testing procedures for leakage must comply with the following:

1. Before any portion of the supply line on the upstream side of a control valve is backfilled, water must be turned on for that portion of the line and maintained at full pressure from the water source for a period not less than 8 consecutive hours after all air has been expelled from the line. Before any

portion of the supply line on the downstream side of the control valve is backfilled, perform the same test for a period not less than 1 hour.

2. Repair leaks that develop in the tested portion of the system. After the leaks have been repaired, repeat the pressure test until no leaks occur as determined by the Engineer.

#### **20-2.01A(4)(c) Sprinkler Coverage Check**

After installation of the sprinklers, check and adjust the entire sprinkler system for proper orientation and uniform coverage.

#### **20-2.01A(4)(d) Irrigation System Functional Tests**

The functional tests for each irrigation controller or group of controllers and associated irrigation system served by a single electric service point must consist of at least 1 complete cycle of operation. The Engineer determines the length of the cycle.

Notify the Engineer at least 10 days before performing each functional test.

#### **20-2.01A(4)(e) Final Irrigation System Check**

Perform the final check of the existing and new irrigation system between 20 and 30 days before Contract acceptance. The Engineer determines the length of the cycle.

Remote control valves connected to existing and new irrigation controllers must be checked for automatic operation when the controllers are in automatic mode.

#### **20-2.01B Materials**

##### **20-2.01B(1) General**

Use minor concrete for replacing removed concrete facilities.

HMA for replacing removed asphalt concrete surfacing and facilities must comply with section 39. You may use minor HMA if authorized.

##### **20-2.01B(2) Garden Valves**

Each garden valve must:

1. Be inverted nose type and of brass or bronze construction with female thread inlet
2. Have a replaceable seat washer, rising valve stem within a protective collar, and male thread hose outlet
3. Have a loose key handle

##### **20-2.01B(3) Recycled Water Identification**

Irrigation components used for recycled water must be manufactured or painted purple. Recycled water irrigation pipe and tubing must have a permanent label with the wording "CAUTION RECYCLED WATER" every 24 inches in 2 rows spaced approximately 180 degrees apart in the longitudinal direction of the pipe or tubing.

The recycled water warning sign must be a decal or a decal attached to a 1/16-inch thick aluminum plate or tag.

Each warning sign decal must:

1. Show the phrase "Recycled Water, Do Not Drink" and the drinking glass graphic symbol
2. Be UV fade and weather resistant and manufactured from flexible vinyl with or without mylar
3. Have a purple background, black text, and self-adhesive backing

Each warning tag must:

1. Show the phrase "RECYCLED WATER" and the drinking glass graphic symbol
2. Be UV fade and weather resistant
3. Be purple, double-sided, and manufactured from polyurethane
4. Have an integral neck attachment and attachment hole capable of withstanding 178 lb of pull-out resistance
5. Have hot-stamped black lettering

Posts and hardware for warning signs must comply with section 56-4.

Concrete sprinkler protectors used with recycled water must be painted purple.

#### **20-2.01B(4) Location Markers**

Location markers must be schedule 40 white PVC plastic pipe.

#### **20-2.01B(5) Pull Boxes**

Pull boxes must comply with section 86-2.06 and be no. 5 or larger unless otherwise shown. Pull boxes for low voltage conductors must not have side openings.

Pull box covers used solely for irrigation electrical service must be marked "IRRIGATION".

#### **20-2.01B(6) Unions**

Unions must be brass or malleable iron capable of withstanding the maximum required working pressure.

#### **20-2.01B(7) Valve Boxes and Covers**

Valve boxes must be precast concrete.

Covers must be:

1. Concrete, steel, or cast iron.
2. Marked "WATER" in cast-in letters not less than 1 inch high.
3. 1 piece, except 2 pieces are required when the weight of the valve box cover exceeds 35 lb.

The valve box covers must include a polyurethane label with the appropriate controller letter and station number as shown.

#### **20-2.01B(8) Wye Strainers**

Wye strainers must:

1. Have a cast iron or all bronze body
2. Have a removable stainless steel strainer screen:
  - 2.1. With an open area equal to at least 3 times the cross-sectional area of the pipe based on an iron pipe size
  - 2.2. With 40-mesh woven wire, except:
    - 2.2.1. For a backflow preventer assembly, the screen must be 20-mesh woven wire mesh or perforated sheet with 0.045-inch diameter holes
    - 2.2.2. For a valve assembly, the screen must be 80-mesh woven wire mesh
3. Be capable of withstanding a working pressure of 150 psi
4. Be equipped with a garden valve at the outlet

The wye strainer filter housing must:

1. Withstand a working pressure of 150 psi
2. Be manufactured of reinforced polypropylene plastic

#### **20-2.01C Construction**

##### **20-2.01C(1) General**

Repair irrigation systems within 24 hours after a malfunction or damage occurs.

Connect underground metallic pipes, valves, or fittings made of dissimilar metals through a dielectric coupling or bushing.

You may install conduits, conductors, and supply lines by methods other than trenching provided that they are not damaged and are installed at the depths specified.

##### **20-2.01C(2) Trenching and Backfilling**

Trench and backfill under section 86-2.01.

Remove plants under 20-1.03C as necessary to perform trenching. If plants are to remain, adjust trench alignment to minimize damage.

If removal of:

1. Turf is required, remove to a maximum width of 12 inches.
2. Groundcover is required, remove to a maximum width of 6 feet. Existing *Carpobrotus* and *Delosperma* may be rototilled if the backfill for the trenches does not contain plants longer than 6 inches in length.

Make a 2-inch deep sawcut along neat lines around the perimeter of the pavement to be removed at locations determined by the Engineer.

The trench must have uniform bearing throughout the entire length and must be free of jagged rubble or sharp objects. Ensure conduit, supply line, and joints are not moved or damaged by backfill operations.

For a project with multiple water service points, excavate and backfill trenches for 1 service point at a time.

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Trenches for irrigation supply lines and conduits 3 inches and larger must be 5 times the pipe or conduit diameter deep and 2 times the pipe or conduit diameter wide.

Trenches for irrigation supply lines and conduits 2-1/2 inches or less in diameter must be a minimum of 12 inches below finished grade, measured from the top of the installed pipe.

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Trenches must be at least 4 feet from curbs, dikes, and paved shoulders.

Rocks and debris encountered during trenching operations must be brought to the surface of the ground. Remove rocks and debris as ordered. This work is change order work.

If trenching requires the removal of plants, in areas with:

1. Turf, replace turf with sod under section 20-3.03C(3)(e).
2. Groundcover, replace groundcover plants from flats and plant at 12 inches on center under section 20-3.03C. No replacement of *Carpobrotus* and *Delosperma* is required if removed by rototilling.

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Where existing surfacing is removed, replace the structural section to match the materials removed. Replacement concrete must be of uniform smoothness, color, and texture equal to the adjacent concrete surface. Dispose of removed material. Install supply line and conduits at the bottom of trenches and backfill with sand to a depth of 2 inches over the top of the supply lines and conduits. Excluding the part of the trench backfilled with surfacing or pavement, the remainder of the trench must be backfilled with material that is excavated from the trench. Rock, broken concrete, asphalt concrete and other particles larger than 2 inches in greatest dimension must not be used.

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### **20-2.01C(3) Pull Boxes**

Install pull boxes under section 86-2.06 at the following locations:

1. At all conductor splices except splices made in valve boxes
2. Within 5 feet of irrigation controllers
3. At ends of electrical conduits
4. At other locations shown

### **20-2.01C(4) Valve Boxes and Covers**

Install and identify each valve box as shown.

In walkways and paved areas, install the top of the valve box flush with the surrounding finished grade.

### **20-2.01C(5) Recycled Water Warning Signs**

Install recycled water warning signs on irrigation facilities using recycled water.

Install sign decals directly to clean, smooth surfaces. Clean the surface with alcohol or an equivalent cleaner before applying the decal.

Install a 4 by 4 inch warning sign decal to each:

1. Backflow preventer assembly
2. Irrigation controller enclosure cabinet door

Install a 2 by 2 inch warning tag to the each remote control valve and valve box cover.

Install a 2-1/2 by 3 inches sign decal to each sprinkler riser.

Under local regulations, install a 12 by 12 inch warning sign decal on an aluminum plate and attach to gates, fences, and walls located in the vicinity of a recycled water irrigation system. On gates and fences, install signs with S hooks and C clips or 14-gauge galvanized steel wire. On concrete walls or other rough surfaces, install signs with a silicon-based adhesive.

#### **20-2.01C(6) Garden Valves**

Furnish 3 keys for each garden valve before Contract acceptance.

#### **20-2.01D Payment**

Not Used

### **20-2.02 EXISTING IRRIGATION FACILITIES**

#### **20-2.02A General**

##### **20-2.02A(1) Summary**

Section 20-2.02 includes specifications for checking, testing, operating, replacing, and relocating existing irrigation facilities.

##### **20-2.02A(2) Definitions**

Reserved

##### **20-2.02A(3) Submittals**

Submit a list of irrigation system deficiencies within 7 days after checking the existing facilities.

##### **20-2.02A(4) Quality Control and Assurance**

After irrigation facilities have been relocated, demonstrate in the presence of the Engineer that the relocated facilities function properly.

Certify each existing backflow preventer under section 20-2.03A(4).

#### **20-2.02B Materials**

Valve box covers must be the same size as the covers they replace.

Control and neutral conductors must be the same size and color as the control and neutral conductors they replace.

#### **20-2.02C Construction**

##### **20-2.02C(1) General**

Notify the Engineer at least 4 business days before shutting off the water supply to any portion of the existing irrigation system and immediately after restoring the water supply to any portion of the existing irrigation system.

If an irrigation facility to be relocated is determined unsuitable by the Engineer, replace irrigation facility under section 20-2. This work is change order work.

##### **20-2.02C(2) Check and Test Existing Irrigation Facilities**

Before performing irrigation system work, check existing irrigation facilities to remain in place or to be relocated. The Engineer determines the test watering cycle lengths. Check for deficiencies including missing parts, damaged components, and improper operation. Correct deficiencies as ordered. The correction of deficiencies is change order work.

### **20-2.02C(3) Operate Existing Irrigation Facilities**

If the Contract includes a bid item for operate existing irrigation facilities, after performing work under section 20-2.02C(2), operate existing irrigation facilities through Contract acceptance.

Operate existing irrigation facilities except for water meters, underground supply lines, control and neutral conductors, and electrical conduits.

Check for proper operation at least once every 30 days. Adjust, repair, or replace existing irrigation facilities within 7 days of finding any deficiency.

Operate irrigation systems using the automatic irrigation controller until Contract acceptance. You may operate irrigation controllers manually during plant replacement, fertilization, weed germination, and repair work.

Program the irrigation controllers for seasonal requirements.

### **20-2.02C(4) Replace Valve Box Covers**

Existing valve box covers shown to be replaced must remain in place until the new covers are ready to be installed.

Dispose of removed valve box covers.

### **20-2.02C(5) Relocate Backflow Preventer Assemblies**

Relocate backflow preventer assembly as shown and install under section 20-2.03C.

### **20-2.02C(6) Relocate Water Meters**

Relocate water meter as shown.

### **20-2.02C(7) Relocate Irrigation Controllers**

Relocate irrigation controller as shown and install under section 20-2.07C.

### **20-2.02D Payment**

Not Used

## **20-2.03 BACKFLOW PREVENTER ASSEMBLIES**

### **20-2.03A General**

#### **20-2.03A(1) Summary**

Section 20-2.03 includes specifications for installing a backflow preventer assembly.

#### **20-2.03A(2) Definitions**

Reserved

#### **20-2.03A(3) Submittals**

Reserved

#### **20-2.03A(4) Quality Control and Assurance**

Each backflow preventer assembly must be certified by a backflow preventer tester. The tester must have an active and valid certification from the water purveyor having jurisdiction.

If the local water purveyor does not have a certification program, the tester must be certified by AWWA or a nearby county with a certification program.

Notify the Engineer at least 5 business days before certifying backflow preventer assembly.

Certify each backflow preventer assembly annually and within 10 days before Contract acceptance.

### **20-2.03B Materials**

#### **20-2.03B(1) General**

Each backflow preventer assembly must include:

1. Backflow preventer including gate valve, wye strainer, brass or malleable iron unions, fittings, and supports
2. Blanket
3. Enclosure
4. Concrete pad

Concrete for the pad must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

#### **20-2.03B(2) Backflow Preventers**

Each backflow preventer must:

1. Be reduced-pressure principle type.
2. Comply with the requirements of the water purveyor that has jurisdiction.
3. Be factory-assembled with:
  - 3.1. 2 check valves
  - 3.2. 1 pressure differential relief valve
  - 3.3. 4 test cocks
  - 3.4. 2 shut-off valves manufactured from iron or bronze. Shut-off valves must be one of the following:
    - 3.4.1. Resilient wedge gate valves
    - 3.4.2. Resilient seated and fully ported ball valves
    - 3.4.3. Resilient seated butterfly valves

Backflow preventer components must be capable of withstanding a working pressure of 150 psi.

#### **20-2.03B(3) Backflow Preventer Blankets**

Each backflow preventer blanket must:

1. Be polyester fabric coated with vinyl or polymeric resin
2. Be resistant to UV light, water, mildew, and fire
3. Have an R-value from R-30 to R-38

Blankets must have a securing mechanism that includes either zippers, hook-pile tape, grommets, snaps, buttons, or any combination of these. Wherever the backflow preventer is not in an enclosure, the securing mechanism must be capable of accepting a padlock.

#### **20-2.03B(4) Backflow Preventer Enclosures**

Each backflow preventer enclosure must:

1. Have expanded metal sides, ends, and top panels fabricated from 9-gauge minimum thickness stainless sheet steel with openings of approximately 3/4 by 1-3/4 inches
2. Have expanded metal panels attached to the 3/16-inch thick steel frame by a series of welds not less than 1/4 inch in length and spaced not more than 4 inches on center, along the edges of the enclosure
3. Have Type 304 stainless steel lock guards with a minimum thickness of 12 gauge.
4. Have hexagonal nuts and lock-type washers
5. Be powder coated by the manufacturer to match color no. 20450 of FED-STD-595.
6. Have padlock clasp or latch and lock mechanism

#### **20-2.03C Construction**

Finish exposed top surfaces of concrete pad with a medium broom finish applied parallel to the long dimension of pads.

Install hold-downs for the backflow preventer assembly enclosure when concrete is still plastic.

#### **20-2.03D Payment**

Not Used

## **20-2.04 CAM COUPLER ASSEMBLIES**

### **20-2.04A General**

Section 20-2.04 includes specifications for installing a cam coupler assembly.

### **20-2.04B Materials**

Each cam coupler assembly must consist of a cam coupler, dust cap, check valve, pipes, fittings, concrete thrust block, and valve box with woven wire cloth and gravel.

Cam couplers and keys must be manufactured of brass or bronze and be able to withstand a working pressure of 150 psi.

Furnish 3 loose cam coupler keys before Contract acceptance.

### **20-2.04C Construction**

Install cam coupler assemblies in valve boxes as shown.

### **20-2.04D Payment**

Not Used

## **20-2.05 CONTROL AND NEUTRAL CONDUCTORS**

### **20-2.05A General**

#### **20-2.05A(1) Summary**

Section 20-2.05 includes specifications for installing control and neutral conductors.

#### **20-2.05A(2) Definitions**

Reserved

#### **20-2.05A(3) Submittals**

Reserved

#### **20-2.05A(4) Quality Control and Assurance**

Perform field tests on control and neutral conductors. Field tests must comply with the specifications for lighting circuits in section 86-2.14B.

Where the conductors are installed by trenching and backfilling, perform field tests after a minimum of 6 inches of backfill material has been placed and compacted over the conductors.

### **20-2.05B Materials**

Control and neutral conductors must comply with the requirements in section 86-2.08.

For connections between 24-volt irrigation controllers and valve solenoids, use control and neutral conductors. Conductors must include a control conductor for each valve and a common neutral.

Conductor insulation color, except for the stripes, must be continuous throughout. The color of the conductors must be consistent from the controller to each valve. Neutral conductors must be white. Do not use white for control conductors. Do not use conductors with green insulation except as permitted by the NEC.

Conductors must be:

1. No. 12 AWG or larger or no. 14 AWG or larger for armor-clad
2. Rated for 36 V or 600 V for armor-clad
3. Rated for direct burial
4. Underground feeder cable Type UF and TWU
5. Solid, uncoated copper for armor-clad
6. Not less than 90 percent of the AWG diameter required

No. 10 and smaller conductors must be insulated with a minimum of 56 mils of PVC or a minimum of 41 mils of polyethylene. No. 8 and larger conductors must be insulated with a minimum of 70 mils of PVC.

No. 10 and smaller armor-clad conductors must be insulated with a minimum of 41 mils of polyethylene. No. 8 and larger armor-clad conductors must be insulated with 54 to 60 mils of PVC.

Armor-clad conductors must include:

1. Stainless steel tape armor, Type 304 and helically wrapped with a 33 percent minimum overlap. The tape must be 0.5 inch wide and at least 0.005 inch thick.
2. PVC outer conductor jacket that is UV resistant and complies with the ICEA S-61-402, NEMA standard WC5 and UL listing 1263. The jacket nominal thickness must be 24 to 30 mils thick.

### **20-2.05C Construction**

#### **20-2.05C(1) General**

Reserved

#### **20-2.05C(2) In Open Trenches**

Do not install control and neutral conductors above each other in an open trench. Wrap conductors together with electrical tape at 5 foot intervals.

Where conductors are installed in the same trench as supply line, install at the same depth as the line. At other locations, install conductors not less than 12 inches below finished grade.

Where conductors are not in a supply line trench, install conductors at least 4 feet from curbs, dikes, and paved shoulders.

#### **20-2.05C(3) In Conduits**

Install conductors in electrical conduit if conductors are to be:

1. Surface mounted
2. Installed in or on structures
3. Installed under paved areas
4. Installed in irrigation conduits
5. Placed in concrete

#### **20-2.05C(4) Splicing**

Splice low voltage control and neutral conductors under sections 86-2.09C, 86-2.09D, and 86-2.09E, except do not use method B. Tape used for splice insulation must be PVC tape.

Leave at least 2 feet of slack for each conductor at each:

1. Pull box
2. Valve box for each conductor that is connected to other facilities within the box or spliced within the box

Do not splice conductors in irrigation controller cabinets.

Permanent splice connections must be made with freshly cut and skinned conductors. Do not use temporary splices made for testing valve circuits as permanent splices.

#### **20-2.05C(5) Marking**

Mark control and neutral conductors in pull boxes, valve boxes, at irrigation control terminals, and at splices.

Mark conductor terminations and splices with adhesive cloth wrap-around markers. Seal markers with clear, heat-shrinkable sleeves.

Mark nonspliced conductors with clip-on C-shaped white extruded PVC sleeves. Sleeves must have black indented legends of uniform depth with transparent overlays over the legends and chevron cuts for the alignment of 2 or more sleeves.

Identify markers for the control conductors with the appropriate irrigation controller and station number.

## **20-2.05D Payment**

Not Used

## **20-2.06 FLOW SENSORS**

### **20-2.06A General**

Section 20-2.06 includes specifications for installing a flow sensor.

### **20-2.06B Materials**

Each flow sensor must be an inline type with a nonmagnetic spinning impeller as the only moving part.

The electronics housing must:

1. Be schedule 80 PVC or cast 85-5-5-5 bronze
2. Include glass-filled polyphenylene sulfide
3. Be easily removable from the meter body and include 2 ethylene-propylene O-rings

The impeller must be tungsten carbide.

The electronics must be rated to withstand prolonged water immersion conditions and include 2 single conductor 18 AWG leads, 48 inches long.

The insulation must be direct burial UF type colored red for the positive lead and black for the negative lead.

The flow sensor must be capable of withstanding:

1. 100 to 400 psi operating pressure depending on sensor size shown
2. Liquid temperatures up to 220 degrees F
3. Flows from 1/2 to 15 ft/sec

### **20-2.06C Construction**

Install flow sensor as shown.

### **20-2.06D Payment**

Not Used

## **20-2.07 IRRIGATION CONTROLLERS**

### **20-2.07A General**

#### **20-2.07A(1) Summary**

Section 20-2.07 includes specifications for installing irrigation controllers.

#### **20-2.07A(2) Definitions**

**irrigation controller:** "Smart" irrigation controller as defined by the Irrigation Association.

**remote irrigation control system (RICS):** Centralized water management system that consists of a base station, centralized server, satellite controllers.

**base station:** Designated computer located at a Department maintenance facility or District Office that collects data from a series of satellite controllers through a centralized server.

**centralized server:** Designated server or web-based application that collects data from all base stations.

**web-based application:** Encrypted managing software that is coded in a browser-supported language and is executable via a common internet web browser (e.g., Microsoft Internet Explorer, Firefox, Safari, etc.).

**satellite controller:** Irrigation controller that communicates directly to a base station or centralized server.

**network communication:** Identified means through which satellite controllers, base stations, and a centralized server communicate to one another (i.e., fiber optics, spread spectrum, phone line, etc.).

**remote access device:** Device (i.e., FCC compliant radio remote, cell phone or wireless, etc.) used to communicate with satellite controllers from a remote location.

### **20-2.07A(3) Submittals**

Submit as an informational submittal, a complete manufacturer's maintenance and operations manual for each type of controller installed. Submit the manual at the time the wiring plans and diagrams are placed inside the controller enclosure or cabinet door.

### **20-2.07A(4) Quality Control and Assurance**

Provide training by a qualified person on the use and adjustment of the irrigation controllers installed 30 days before Contract acceptance.

Modifications to electrical components must be done by the manufacturer before shipment to the job site.

The installation date and expiration date of the manufacturer's guarantee for the controllers must be permanently marked on the inside face of the controller.

### **20-2.07B Materials**

#### **20-2.07B(1) General**

Conventional A/C powered irrigation controllers must operate on 110/120 V, 60 Hz(ac) and supply 24 to 30 VAC, 60 Hz(ac) for operating electrical remote control valves.

Concrete for the pad and foundation must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

#### **20-2.07B(2) Irrigation Controllers**

##### **20-2.07B(2)(a) General**

The irrigation controllers must:

1. Be A/C, battery, solar, or 2-wire as shown
2. Be from a single manufacturer.
3. Be fully automatic and capable of operating a complete 30-day or longer irrigation program.
4. Have a switch or button on the face of the irrigation control panel showing that the irrigation controller can be turned on or off and provide for automatic or manual operation. Manual operation must allow cycle start at the desired station and allow for the minimum activation of a single station or have the option to operate multiple stations in sequential or simultaneous operation modes.
5. Have non-volatile memory.
6. Have a watering time display on the face of the control panel.
7. Have a panel and circuit board connected to the low voltage control and neutral conductors by means of a plug and receptacle connectors located within the cabinet enclosure.
8. Have a variable or incremental timing adjustment ranging from 1 minute to 360 minutes per station.
9. Be capable of operating at least 3 program schedules.
10. Be capable of having at least 4 start times per program schedule.
11. Have an output that can energize a pump start circuit or a remote control master valve.
12. Be protected by fuses and circuit breakers.
13. Display a program and station affected by a sensory alert without altering other watering schedules not affected by the alert.
14. Be capable of global manual and automatic seasonal adjustments to all valves in any given program.
15. Automatically alter watering schedule in accordance with evapotranspiration data provided by a local weather station or have an internal programmed default of historical evapotranspirational data for a given region.
16. Support a flow sensor, rain sensor, or weather station and have automatic shut-off capability.
17. Be capable of communicating with the remote access device.

If the irrigation controller is installed in an enclosure cabinet, the cabinet must be stainless steel and must comply with section 86-3.04A.

Irrigation controllers not installed in enclosure cabinets must be weatherproof, constructed of fiberglass or metal and have a door lock with 2 keys provided.

RICS must meet the requirements of an irrigation controller and be capable of being accessible only through a secured and encrypted server that is password and firewall protected by the Department or be accessible through a firewall secure remote server that is independent from any Department servers. The Department will set up and manage the network communication.

#### **20-2.07B(2)(b) Battery Powered Irrigation Controllers**

Reserved

#### **20-2.07B(2)(c) Solar Powered Irrigation Controllers**

Reserved

#### **20-2.07B(2)(d) Two-wire Irrigation Controllers**

Reserved

#### **20-2.07B(3) Irrigation Controller Enclosure Cabinets**

The irrigation controller enclosure cabinet must:

1. Be stainless steel.
2. Include a mounting panel. Fabricate mounting panels with one of the following:
  - 2.1. 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.
  - 2.2. 3/16-inch thick aluminum sheets.
  - 2.3. 10-gauge cold-rolled steel sheets.
  - 2.4. 0.157-inch stainless steel metal sheets.
3. Provide cross ventilation, roof ventilation, or a combination of both. Ventilation must not compromise the weather resistance properties of the cabinet and must be fabricated by the cabinet manufacturer.
4. Include protection against lightning damage.
5. Have an area inside the cabinet doors for storage of the as-built schematic wiring diagram and irrigation plans.
6. Have padlock clasp or latch and lock mechanism.

#### **20-2.07B(4) Rain Sensors**

A rain sensor unit must be a solid state, automatic shut-off type, and compatible with the irrigation controller. The rain sensor unit must automatically interrupt the master remote control valves when approximately 1/8 inch of rain has fallen. The irrigation controller must automatically be enabled again when the accumulated rainfall evaporates from the rain sensor unit collection cup.

Rain sensor units must be one of the following:

1. Rated 24 V(ac) to 30 V(ac)
2. Wireless and FCC compliant

#### **20-2.07C Construction**

Finish exposed top surface of concrete pad with a medium broom finish applied parallel to the long dimension.

Locate irrigation controllers in pedestal or wall mounted enclosures as shown.

Install electrical components for automatic irrigation systems under section 86-1.02.

Install irrigation controllers under the manufacturer's instructions and as shown.

If 2 or more irrigation controllers operate the same remote master control valve, furnish and install an isolation relay under the controller manufacturer's instructions.

Where direct burial conductors are to be connected to the terminal strip, connect the conductors with the open-end-crimp-on wire terminals. Exposed wire must not extend beyond the crimp of the terminal and the wires must be parallel on the terminal strip.

Install rain sensor units for irrigation controllers on the irrigation controller enclosure cabinets. Provide protection against lightning damage.

**20-2.07D Payment**

Payment for electrical service for 120-volt or higher is not included in the payment for irrigation controller.

**20-2.08 IRRIGATION CONDUIT**

**20-2.08A General**

**20-2.08A(1) Summary**

Section 20-2.08 includes specifications for installing irrigation conduit under a roadway or other facility to accommodate electrical conduit for control and neutral conductors and irrigation supply lines.

Before performing work on irrigation systems, locate existing conduits shown to be incorporated into the new work.

Before removing or disturbing existing Type A pavement markers that show the location of the existing conduit, mark the location of the existing conduit on the pavement.

**20-2.08A(2) Definitions**

Reserved

**20-2.08A(3) Submittals**

Reserved

**20-2.08A(4) Quality Control and Assurance**

Demonstrate the conduits are free of obstructions after placement of base and surfacing.

Before and after extending the irrigation supply line in a conduit, pressure test the supply line under section 20-2.01A(4)(b).

After conductors are installed in a conduit, test the conductors under section 20-2.05A(4).

Assign a technical representative to direct and control the directional bore activities. The representative must be present during directional bore activities. Unless otherwise authorized, perform directional bore activities in the presence of the Engineer.

**20-2.08B Materials**

**20-2.08B(1) General**

Reserved

**20-2.08B(2) ABS Composite Pipe Conduit**

ABS composite pipe and couplings must comply with ASTM D 2680. Couplings must be solvent cement type.

**20-2.08B(3) Corrugated High Density Polyethylene Pipe Conduit**

Corrugated high density polyethylene pipe must comply with ASTM F 405 and F 667 or be Type S and comply with AASHTO M252 and M294. Couplings and fittings must be as recommended by the pipe manufacturer.

**20-2.08B(4) Corrugated Steel Pipe Conduit**

Corrugated steel pipe conduit must comply with section 66. The nominal thickness of metal sheets for pipe must be 0.064 inch for corrugated steel pipe and 0.060 inch for corrugated aluminum pipe. Coupling bands and hardware must comply with section 66.

**20-2.08B(5) Polyvinyl Chloride Pipe Conduit**

PVC pipe conduit must be schedule 40 and comply with ASTM D 1785.

Fittings must be schedule 80.

**20-2.08B(6) Welded Steel Pipe Conduit**

Welded steel pipe must comply with ASTM A 53. Pipe must be black and have either welded or threaded joints.

The minimum wall thickness for the various sizes of welded steel pipe must comply with the dimensions shown in the following table:

Pipe size, nominal (inch)	Minimum wall thickness (inch)
3	0.216
4	0.237
6	0.280
8	0.277
10	0.279
12	0.330

**20-2.08C Construction**

**20-2.08C(1) General**

When existing conduits are to be incorporated in new work, excavate exploratory holes for locating existing conduits at the locations indicated by existing markers or as directed. Excavate and backfill exploratory holes to a maximum size of 2-1/2 feet in width, 5 feet in depth, and 5 feet on each side of the marker or directed location parallel to the roadway. If the conduit is not found and if ordered, increase the size of the exploratory holes beyond the dimensions specified. The additional excavation and backfill is change order work.

If extending an existing conduit, remove conductors from the conduit.

Use a coupling band if the new conduit matches the existing conduit diameter, otherwise overlap the conduit at least 12 inches.

After extending existing conduits, install conductors that match the color and size of the existing conductors without splices. Splice conductors in adjacent pull boxes.

If installing a control and neutral conductor and electrical conduit through the irrigation conduit, install a no. 5 pull box at each end.

Remove debris found in the conduit before performing other work. Debris found more than 3 feet from the ends of the conduits is removed as change order work.

Extend conduit 2 feet beyond all paving unless otherwise shown.

Cap the ends of unused conduit.

Designate the location of each conduit by cementing a Type A pavement marker as shown. Type A pavement markers and adhesive must comply with section 85.

**20-2.08C(2) Welded Steel Pipe Conduit**

**20-2.08C(2)(a) General**

Install welded steel pipe by directional boring or jack and drill.

Install top of conduits:

- 1. 18 to 30 inches below the finished surface in sidewalk areas
- 2. 40 to 52 inches below the finished grade in other paved areas

**20-2.08C(2)(b) Directional Boring**

Notify the Engineer 2 business days before starting directional bore activities.

The diameter of the boring tool for directional boring must be only as large as necessary to install the conduit.

Mineral slurry or wetting solution may be used to lubricate the boring tool and to stabilize the soil surrounding the boring path. The mineral slurry or wetting solution must be water based.

The directional bore equipment must have directional control of the boring tool and have 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.

#### **20-2.08C(2)(c) Jack and Drill**

Notify the Engineer 2 business days before starting jack and drill activities.

Jacking or drilling pits must be no closer than 2 feet from pavement edge whenever possible.

If authorized, small holes may be cut in the pavement to locate or remove obstructions.

Do not use excessive water that will soften subgrade or undermine pavement.

#### **20-2.08C(3) Schedule 40 Pipe Conduit**

Where schedule 40 pipe conduit 2 inches or less in outside diameter is installed under surfacing, you may install by directional boring under section 20-2.08C(2)(b).

For conduit 2 inches or less in diameter, the top of the conduit must be a minimum of 18 inches below surfacing.

Extend schedule 40 pipe conduit 6 inches beyond surfacing. Cap ends of conduit until used.

#### **20-2.08D Payment**

Schedule 40 PVC pipe conduit is paid for as plastic pipe (schedule 40) (supply line).

### **20-2.09 IRRIGATION SUPPLY LINE**

#### **20-2.09A General**

##### **20-2.09A(1) Summary**

Section 20-2.09 includes specifications for installing irrigation supply line.

If the supply line location interferes with the excavation of plant holes, relocate the plant hole to clear the supply line. Do not install supply lines through plant holes unless shown.

Supply lines, control and neutral conductors and electrical conduits installed in common trenches must not be installed above each other.

##### **20-2.09A(2) Definitions**

Reserved

##### **20-2.09A(3) Submittals**

Submit a certificate of compliance for polyethylene pipe and plastic pipe supply line.

##### **20-2.09A(4) Quality Control and Assurance**

Solvent cement must comply with the local Air Quality Management District requirements.

#### **20-2.09B Materials**

##### **20-2.09B(1) General**

Irrigation supply pipe must be metal or plastic as shown.

PCC for thrust blocks must be produced from commercial-quality aggregates. The concrete must contain at least 295 pounds of cementitious material per cubic yard.

##### **20-2.09B(2) Copper Pipe Supply Line**

Copper pipe must be Type K rigid pipe and comply with ASTM B 88. Fittings must be wrought copper or cast bronze either soldered or threaded.

Solder must be 95 percent tin and 5 percent antimony.

**20-2.09B(3) Galvanized Steel Pipe Supply Line**

Galvanized steel pipe supply line and couplings must be standard weight and comply with ASTM A 53, except that the zinc coating must not be less than 90 percent of the specified amount. Except for couplings, fittings must be galvanized malleable iron, banded and threaded, and comply with ANSI B16.3, Class 150.

Joint compound must be nonhardening and noncorrosive. Do not use pipe thread sealant tape.

**20-2.09B(4) Drip Irrigation Tubing**

Drip irrigation tubing must be virgin polyethylene plastic and comply with ASTM D 2737.

The drip irrigation tubing must be distribution tubing with preinstalled in-line emitters.

If preinstalled in-line drip irrigation tubing is not shown, you may install emitters that match the distribution requirements shown. The emitters must be barbed or threaded-type outlet devices with dual silicone diaphragms and installed under the manufacturer's instructions.

The emitters must meet the flow rate and operating pressure range shown.

The wall thickness of polyethylene tubing must comply with the following requirements when tested under ASTM D 2122:

Pipe size, nominal (inch)	Minimum wall thickness (inch)	Maximum wall thickness (inch)
1/2	0.050	0.070
5/8	0.055	0.075
3/4	0.060	0.080

The polyethylene tubing fittings must be leak-free, compression type and have female sockets with an internal barb to provide a positive pipe-to-fitting connection that will not separate at the designed pressure.

**20-2.09B(5) Plastic Pipe Supply Line**

Plastic pipe supply line must be PVC pipe that is NSF approved.

Schedule 40 plastic pipe supply line must comply with ASTM D 1785.

Class 315 plastic pipe supply line must comply with ASTM D 2241.

PVC gasketed bell joints must comply with ASTM D 2672, ASTM D2241, ASTM D 3139, and ASTM F 477.

For solvent-cemented type joints, the primer and solvent cement must be made by the same manufacturer. The primer color must contrast with the color of the pipe and fittings.

Solvent-cemented fittings must be injection molded PVC, schedule 40, and comply with ASTM D 2466.

Fittings for supply line placed in irrigation conduit must be schedule 80.

Fittings for plastic pipe supply line larger than 4 inches must be ductile iron under section 20-2.14C(2)(b).

If UV-resistant plastic pipe supply line is required, the pipe must be homogeneous, uniform color and be manufactured of:

1. At least 80 percent vinyl chloride resin with UV stabilizers
2. Non-PVC resin modifiers and coloring ingredients
3. Coloring ingredients with UV stabilizers

**20-2.09C Construction**

**20-2.09C(1) General**

Cut pipe straight and true. After cutting, ream out the ends to the full inside diameter of the pipe.

Prevent foreign material from entering the irrigation system during installation. Immediately before assembling, clean all pipes, valves, and fittings. Flush lines before attaching sprinklers, emitters, and other terminal fittings.

Pipe supply lines installed between the water meter and backflow preventer assembly must be installed not less than 18 inches below finished grade measured to the top of the pipe.

Where a connection is made to existing supply lines, bell and gasketed fittings or compression fittings may be used.

Install a thrust block at each change in direction on the main supply line, terminus run, and at other locations shown.

Where supply lines cross paved ditches more than 3 feet deep at their flow line, install galvanized steel pipe for the entire span of the ditch.

Secure UV resistant plastic pipe supply line on grade as shown.

#### **20-2.09C(2) Galvanized Steel Pipe Supply Line**

Coat male pipe threads on galvanized steel pipe according to the manufacturer's instructions.

#### **20-2.09C(3) Drip Irrigation Tubing**

Install drip irrigation tubing on grade and under manufacturer's instructions.

Install a flush valve and an air-relief valve if recommended by the drip valve assembly manufacturer.

#### **20-2.09C(4) Plastic Pipe Supply Line**

For PVC pipe 1-1/2 inches in diameter or smaller, cut the pipe with PVC cutters.

For solvent-cemented type joints, apply primer and solvent-cement separately under the manufacturer's instructions.

Wrap the male portion of each threaded plastic pipe fitting with at least 2 layers of pipe thread sealant tape.

Install plastic pipe supply line mains with solvent-cemented type joints not less than 18 inches below finished grade measured to the top of the pipe.

Install plastic pipe supply line laterals with solvent-cemented type joints not less than 12 inches below finished grade measured to the top of the pipe.

Snake plastic pipe installed by trenching and backfilling methods.

#### **20-2.09D Payment**

Supply line pipe and drip irrigation tubing are measured along the slope.

### **20-2.10 SPRINKLER ASSEMBLIES**

#### **20-2.10A General**

Section 20-2.10 includes specifications for installing sprinkler assemblies.

#### **20-2.10B Materials**

##### **20-2.10B(1) General**

Each sprinkler assembly must meet the characteristics shown in the irrigation legend.

Where shown, a sprinkler assembly must have a flow shut-off device that automatically stops the flow of water on the downstream side of the device when the assembly is broken. You may use a sprinkler assembly with a preinstalled flow shut-off device or you must install a flow shut-off device under the manufacturer's instructions.

Flexible hose for sprinkler assembly must be leak-free, nonrigid and comply with ASTM D 2287, cell Type 6564500. The hose wall thickness must comply with ASTM D 2122 for the hose diameters shown in the following table:

Hose diameter, nominal (inch)	Minimum wall thickness (inch)
1/2	0.127
3/4	0.154
1	0.179

Solvent cement and fittings for flexible hose must comply with section 20-2.09B(5).

**20-2.10B(2) Pop-Up Sprinkler Assemblies**

Each pop-up sprinkler assembly must include a body, nozzle, swing joint, pressure compensation device, check valve, sprinkler protector, and fittings as shown.

**20-2.10B(3) Riser Sprinkler Assemblies**

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Each riser sprinkler assembly must include a riser or flexible hose, threaded nipple, swing joint, check valve, and nozzle as shown. The riser must be UV resistant schedule 80, PVC 1120 or PVC 1220 pipe and comply with ASTM D 1785.

**20-2.10B(4) Tree Well Sprinkler Assemblies**

Each tree well sprinkler assembly must include a body, riser, swing joint, perforated drainpipe, and drain cap.

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The perforated drainpipe must be commercial grade, rigid, PVC pipe with holes spaced not more than 6 inches on center on 1 side of the pipe.

Drain cap must be commercially available, 1 piece, injection molded drain grate manufactured from structural foam polyolefins with UV light inhibitors. Drain grate must be black.

Gravel for filling the drainpipe must be graded such that 100 percent passes the 3/4-inch sieve and 100 percent is retained on the 1/2-inch sieve. Gravel must be clean, washed, dry, and free from clay or organic material.

**20-2.10C Construction**

Install pop-up and riser sprinkler assembly:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences and walls

If sprinkler assembly cannot be installed within these limits, the location will be determined by the Engineer.

Set sprinkler assembly riser on slopes perpendicular to the plane of the slope.

Install tree well sprinkler assembly as shown.

**20-2.10D Payment**

Not Used

**20-2.11 VALVES**

**20-2.11A General**

Section 20-2.11 includes specifications for installing valves.

**20-2.11B Materials**

**20-2.11B(1) General**

Valves must:

1. Include a valve box and cover
2. Be the same size as the supply line that the valve serves unless otherwise shown

3. Be bottom, angled, or straight inlet configuration

**20-2.11B(2) Ball Valves**

Ball valve must be a two-piece brass or bronze body and comply with the requirements shown in the following table:

Property	Requirements
Nonshock working pressure, min	400 psi
Seats	PTFE
O-ring seals	PTFE

Ball valve must be the same size as the supply line that the valve serves.

**20-2.11B(3) Check Valves**

Each check valve must:

1. Be schedule 80 PVC and factory set to 5 psi for adjustable spring check valve
2. Be Class 200 PVC for swing check valves on non pressurized plastic irrigation supply line

**20-2.11B(4) Drip Valve Assemblies**

Each drip valve assembly must include:

1. Remote control valve
2. Wye filter with:
  - 2.1. Filter housing that:
    - 2.1.1. Can withstand a working pressure of 150 psi
    - 2.1.2. Is manufactured of reinforced polypropylene plastic
  - 2.2. Reusable stainless steel filter cartridge with a 200 mesh size filtration
3. Ball valve under 20-2.11B(2)
4. Schedule 80 PVC pipes and fittings
5. Pressure regulator

**20-2.11B(5) Garden Valve Assemblies**

Each garden valve assembly must have:

1. Garden valve
2. Location marker

**20-2.11B(6) Gate Valves**

Gate valves must be:

1. Flanged or threaded type
2. Iron or bronze body
3. Bronze trimmed with one of the following:
  - 3.1. Internally threading rising stem
  - 3.2. Nonrising stem
4. Able to withstand a working pressure of 150 psi
5. Same size as the pipeline that the valves serves unless otherwise shown

Gate valves smaller than 3 inches must have a cross handle.

Gate valves 3 inches or larger must be flanged type with a square nut. Furnish 3 long shank keys before Contract acceptance.

Gate valves attached to the outlets of a wye strainer must have seating rings on the discharge side of the gate valves must be PTFE. Valve wedges must be driven obliquely by cam action into the seating rings.

**20-2.11B(7) Pressure Regulating Valves**

Pressure regulating valve must be:

1. Flanged or threaded type
2. Brass, bronze, cast iron, or plastic body
3. Spring diaphragm type
4. Pilot controlled

Pressure regulating valve must have no internal filter screens.

#### **20-2.11B(8) Pressure Relief Valves**

Pressure relief valve must have a brass or bronze body, stainless steel springs, bronze nickel chrome seats, composition seat discs, female bottom inlets, and female side outlets.

#### **20-2.11B(9) Quick Coupling Valves**

Quick coupling valve must be 3/4 inch double slotted with a self-closing cap, 3/4-inch brass key and 3/4-inch brass hose swivel unless otherwise shown. Except for the cap, quick coupling valve must be brass or bronze construction. Furnish 3 loose quick coupling brass keys and brass hose swivels before Contract acceptance.

#### **20-2.11B(10) Remote Control Valves**

##### **20-2.11B(10)(a) General**

Each remote control valve must:

1. Be normally closed type.
2. Be glass filled nylon, brass, or bronze.
3. Be completely serviceable from the top without removing the valve body from the system.
4. Be equipped with a device that regulates and adjusts the flow of water and be provided with a manual shut-off. The manual shut-off for valves larger than 3/4 inch must be operated by a cross handle.
5. Have solenoids compatible with the irrigation controller.
6. Have a manual bleed device.
7. Be capable of withstanding a pressure of 200 psi
8. Have replaceable compression discs or diaphragms.
9. Have threaded fittings for inlets and outlets.
10. Have DC latching solenoids when used with solar or battery controllers. Solenoids must operate on 3.5 V.

##### **20-2.11B(10)(b) Remote Control Valves with Flow Sensor**

Reserved

##### **20-2.11B(10)(c) Remote Control Valves with Pressure Regulator**

Each remote control valve with pressure regulator must be factory assembled as 1 unit.

##### **20-2.11B(11) Wye Strainer Assemblies**

Each wye strainer assembly must include:

1. Wye strainer
2. Garden valve

#### **20-2.11C Construction**

##### **20-2.11C(1) General**

Install control valves:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences, walls, or both

If a control valve cannot be installed within these limits, the location will be determined by the Engineer.

##### **20-2.11C(2) Check Valves**

Unless otherwise shown, install spring-action check valves as necessary to prevent low head drainage.

**20-2.11C(3) Garden Valve Assemblies**

Install a location marker 8 to 10 inches from the back of each garden valve.

**20-2.11C(4) Pressure Regulating Valves**

Install pressure regulating valves with threaded connections and a union on the inlet side of the valves.

**20-2.11C(5) Wye Strainer Assemblies**

Unless shown, install wye strainer assembly on the upstream side of the remote control valves.

Install garden valve so that when the system is flushed, the discharge sprays out of the valve box.

**20-2.11D Payment**

Not Used

**20-2.12 WATER METERS**

Reserved

**20-2.13 RESERVED****20-2.14 SUPPLY LINE ON STRUCTURES****20-2.14A General****20-2.14A(1) General****20-2.14A(1)(a) Summary**

Section 20-14 includes specifications for installing water supply lines through bridges and on the exterior of concrete structures.

**20-2.14A(1)(b) Definitions**

Reserved

**20-2.14A(1)(c) Submittals**

Submit a work plan for temporary casing support at the abutments as an informational submittal.

**20-2.14A(1)(d) Quality Control and Assurance****20-2.14A(1)(d)(i) General**

Before installing seismic expansion assemblies or expansion assemblies, the Engineer must authorize the extension setting.

**20-2.14A(1)(d)(ii) Regulatory Requirements**

Piping materials must bear the label, stamp, or other markings of the specified standards.

**20-2.14A(1)(d)(iii) Site Tests**

Test water supply lines before:

1. Backfilling
2. Beginning work on box girder cell decks
3. Otherwise covering the water supply lines

Furnish pipe anchorages to resist thrust forces occurring during testing.

Test the water supply lines as 1 unit. The limits of the unit must be 5 feet beyond the casing at each end of the bridge.

Cap each end of the water supply lines before testing. Caps must be rated for the test pressure.

Test water supply lines under section 20-2.01A(4)(b), except that the testing period must be 4 hours with no pressure drop.

For water supply lines 4 inches and larger testing must meet the following additional requirements:

1. Testing pressure must be at least 120 psi
2. Air relief valve must not be subjected to water pressure due to testing

If water supply lines fail testing, retest the lines after repair.

### **20-2.14A(2) Materials**

#### **20-2.14A(2)(a) General**

Protect stored piping from moisture and dirt. Elevate piping above grade. Support piping to prevent sagging and bending.

Protect flanges, fittings, and assemblies from moisture and dirt.

#### **20-2.14A(2)(b) Air Release Valve Assemblies**

Air release valve assemblies include an air release valve, ball valve, tank vent, nipples, and pipe saddle. Assemblies must comply with the following:

1. Air release valves must have a cast iron body with stainless steel trim and float, 1-inch NPT inlet, 1/2-inch NPT outlet, and 3/16-inch orifice.
2. Ball valves must have a 2-piece bronze body with chrome plated or brass ball, 1-inch full-size port, and be rated for at least 400 psi.
3. Tank vents must have a 1/2-inch NPT inlet and downward-facing double openings with screened covers.
4. Nipples must be schedule 40 galvanized steel pipe.
5. Pipe saddle must be rated for at least 150 psi and compatible with water supply line. Pipe saddle must be (1) single strap pipe saddle for water supply lines smaller than 4 inches or (2) double strap pipe saddle for water supply lines 4 inches and larger. You may use a tee fitting for galvanized steel water supply lines.

#### **20-2.14A(2)(c) Casings**

Casings must be welded steel pipe casing complying with section 70-7.

#### **20-2.14A(2)(d) Pipe Wrap Tape**

Pipe wrap tape must be pressure sensitive tape made from PVC or polyethylene. Pipe wrap tape must be at least 50 mils thick and not wider than 2 inches.

#### **20-2.14A(2)(e) Pipe Hangers**

Pipe hangers must comply with section 70-7.02C.

The pipe hanger must be rated for the water supply line. If casings are shown, include the casings weight.

#### **20-2.14A(2)(f) Epoxy Adhesives**

Epoxy used for anchoring concrete pipe supports must comply with section 70-7.02D.

#### **20-2.14A(2)(g) Concrete Pipe Supports**

Concrete pipe supports must comply with section 70-7.02D.

#### **20-2.14A(2)(h) Pipe Clamps and Anchors**

Metal clamps must be commercial quality steel complying with section 75-1.02. Anchors must comply with the specifications for concrete anchorage devices in section 75-1.03C.

#### **20-2.14A(2)(i) Pull Boxes**

Pull boxes and covers must comply with section 20-2.01B(5).

### **20.2.14A(3) Construction**

#### **20-2.14A(3)(a) General**

Support water supply lines as described.

Where water supply lines penetrate bridge superstructure concrete, either form or install pipe sleeves at least 2 pipe sizes larger than the pipe.

**20-2.14A(3)(b) Preparation**

Clean the interior of the pipe before installation. Cap or plug openings as pipe is installed to prevent the entrance of foreign material. Leave caps or plugs in place until the next pipe section is installed.

**20-2.14A(3)(c) Installation****20-2.14A(3)(c)(i) General**

Reserved

**20-2.14A(3)(c)(ii) Casings**

Install casings under section 70-7.03.

Seal casing end with 8 inches of polyurethane foam at dirt stop or pipe end seal.

**20-2.14A(3)(c)(iii) Wrapping Water Supply Line**

Wrap damaged supply line coatings with pipe wrap tape. Wrap field joints and fittings that are in contact with the earth.

Wrapping must comply with the following:

1. Clean and prime area as recommended by the tape manufacturer.
2. Tightly wrap tape with 1/2 uniform overlap, free from wrinkles and voids, to provide not less than a 100 mil thickness.
3. The tape must conform to joint or fitting contours.
4. Extend tape at least 6 inches over adjacent pipe.

**20-2.14A(3)(c)(iv) Pipe Clamps and Anchors**

Install water supply lines on the exterior surfaces of bridges or other concrete structures with metal clamps and anchors.

Drilling of holes for anchors must comply with the following:

1. Drill holes to manufacturers recommended depth.
2. Drilling tools must be authorized.
3. Do not drill holes closer than 6 inches to the edge of a concrete structure.
4. Relocate holes if reinforcing steel is encountered. Fill abandoned holes with mortar. Mortar must comply with section 51-1.02F.

Where water supply lines are mounted vertically for more than 2 feet, install clamps and anchors within 6 inches of the elbows.

Where water supply lines are mounted vertically for more than 10 feet, install additional clamps and anchors at 10 foot centers unless otherwise shown.

**20-2.14A(3)(d) Sequences of Operation**

If the bridge superstructure is to be prestressed do not place mortar around casings in abutments and hinges until bridge superstructure prestressing has been completed.

**20-2.14A(4) Payment**

Supply line on structures is measured from end to end, along the centerline.

The Department does not pay for failed tests.

**20-2.14B Supply Line on Structures, Less than 4 Inches****20-2.14B(1) General****20-2.14B(1)(a) Summary**

Section 20-2.14B includes specifications for installing water supply lines smaller than 4 inches.

**20-2.14B(1)(b) Definitions**

Reserved

**20-2.14B(1)(c) Submittals**

Product data for materials includes catalog cuts, performance data, and installation instructions.

Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Casing insulators
4. Pipe end seals
5. Pipe anchorages
6. Air release valve assemblies
7. Casings
8. Pipe hangers
9. Epoxy adhesives
10. Concrete pipe supports

**20-2.14B(1)(d) Quality Control and Assurance**

Reserved

**20-2.14B(2) Materials****20-2.14B(2)(a) General**

Reserved

**20-2.14B(2)(b) Water Supply Line**

Water supply lines must comply with section 20-2.09.

**20-2.14B(2)(c) Expansion Assemblies**

Expansion assemblies must consist of a hose with ends, insulated flange connections, and elbows. Expansion assemblies must have the same nominal inside diameter as the water supply line. Working pressure must be at least 150 psi.

Hose must be medium or heavy weight, crush and kink resistant, rated for at least 150 psi. Cover must be flexible, oil resistant rubber or synthetic, reinforced with at least 2-ply synthetic yarn or steel wire. The inner tube must meet FDA and USDA Standards for potable water. Hose ends must be stainless steel flanged connections with stainless steel crimped bands or swaged end connectors. Do not use barbed ends with band clamps.

Elbows must be 45 degree, standard weight galvanized steel fittings.

**20-2.14B(2)(d) Casing Insulators**

Casing insulators must be:

1. 2-piece, high-density, injection-molded polyethylene, nonconductive inner liner, with cadmium-plated nuts and bolts.
2. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any contact between pipe and casing and have at least 2 runners seated on the bottom of the casing.
3. Sized for the casing and water supply line shown.

**20-2.14B(2)(e) Pipe Anchorages**

Pipe anchorages must consist of an I-beam, U-bolts, anchors, and double nuts.

Use concrete anchorage devices for anchors on existing bridges. Use L-anchor bolts for anchors on new bridges.

Fabricate the I-beam from 1/2-inch steel plate. Steel plate, U-bolts, L-anchors, and nuts must comply with section 75-1.02. Concrete anchorage devices must comply with section 75-1.03C.

**20-2.14B(2)(f) Pipe End Seals**

Pipe end seals must consist of a pipe end seal, stainless steel bands, and polyurethane foam.

Pipe end seal must be factory constructed from seamless neoprene and sized for the casing and water supply line shown. Neoprene must be at least 1/8 inch thick. Stainless steel bands must be crimped.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

**20-2.14B(3) Construction**

Locate pipe anchorage halfway between expansion assemblies.

Pipe end seal must be pulled onto the casing during pipe installation. Do not use wrap-around type end seals.

**20-2.14B(4) Payment**

Supply line on structures is paid for as galvanized steel pipe (supply line on bridge).

**20-2.14C Supply Line on Structures, 4 Inches and Larger**

**20-2.14C(1) General**

**20-2.14C(1)(a) Summary**

Section 20-2.14C includes specifications for installing water supply lines 4 inches and larger.

**20-2.14C(1)(b) Definitions**

Reserved

**20-2.14C(1)(c) Submittals**

Product data for materials includes catalog cuts, performance data, and installation instructions.

Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Flange insulating gaskets
4. Casing insulators
5. Seismic expansion assemblies
6. Lateral restraint assemblies
7. Air release valve assemblies
8. Casings
9. Pipe hangers
10. Epoxy adhesives
11. Concrete pipe supports

Submit the maximum range and preset dimension for each expansion assembly or seismic expansion assembly as an informational submittal.

Submit at least 5 sets of product data to OSD, Documents Unit. Each set must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two sets will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

**20-2.14C(1)(d) Quality Control and Assurance**

Reserved

**20-2.14C(2) Materials**

**20-2.14C(2)(a) General**

Reserved

**20-2.14C(2)(b) Water Supply Line**

Water supply lines must consist of ductile iron pipe and fittings. Pipe must comply with ANSI/AWWA C151/A21.51, Class 350. Fittings must comply with ANSI/AWWA C110/A21.10, rated for a working pressure of 350 psi.

Ductile iron pipe connections to expansion assemblies must be a flanged joint complying with ANSI/AWWA C115/A21.15. Flange gaskets must be rated for a working pressure of 350 psi. Fasteners must comply with section 75-1.02, except that stainless steel fasteners must not be used.

All other ductile iron pipe and fitting joints must be push-on, restrained type complying with ANSI/AWWA C111/A21.11. Push-on, restrained type joints may use proprietary dimensions and proprietary restrained joint locking systems.

Ductile iron pipe and fittings must have an asphaltic coating complying with ANSI/AWWA C151/A21.51, and a cement mortar lining complying with ANSI/AWWA C104/A21.4.

#### **20-2.14C(2)(c) Expansion Assemblies**

Expansion assemblies must be a sleeve type expansion joint. The expansion assembly must have:

1. Ductile iron body complying with ANSI/AWWA C153/A21.53
2. Flanged ends complying with ANSI/AWWA C110/A21.10
3. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
4. Internal expansion sleeve limiting stop collars and be pressure balanced
5. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
6. NSF 61 certification

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

#### **20-2.14C(2)(d) Flange Insulating Gaskets**

Flange insulating gaskets must consist of a dielectric flange gasket, insulating washers and sleeves, and commercial quality steel bolts and nuts. Dielectric flange gasket must have a dielectric strength of at least 500 vpm.

#### **20-2.14C(2)(e) Casing Insulators**

Casing insulators must be:

1. 2-piece, 8-inch, 14-gauge epoxy-coated or galvanized steel band, four 2-inch-wide glass-reinforced polyester or polyethylene runners, with cadmium-plated nuts and bolts.
2. Coated with at least 15-mils heat-fused PVC to provide a nonconductive inner liner.
3. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any pipe to casing contact and have at least 2 runners seated on the bottom of the casing.
4. Sized for the casing and water supply line shown.

#### **20-2.14C(2)(f) Dirt Stops**

Dirt stops must consist of a redwood cover with polyurethane foam.

Use construction heart grade redwood complying with 57-2.01B(2). Construct cover to fit snugly around the water supply line. The cover must be 2 inches taller and 2 inches wider than the casing.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

#### **20-2.14C(2)(g) Seismic Expansion Assemblies**

Seismic expansion assemblies must be a sleeve type expansion joint with integral ball joints at each end.

Seismic expansion assemblies must have:

1. Ability to withstand at least 15 degree angular deflection at each end and maximum movement in all 3 planes at the same time
2. Ductile iron body complying with ANSI/AWWA C153/A21.53
3. Flanged ends complying with ANSI/AWWA C110/A21.10
4. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
5. Internal expansion sleeve limiting stop collars and pressure balanced
6. Ball joints contained in flanged retainers with seal gaskets
7. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches

8. NSF 61 certification

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

**20-2.14C(2)(h) Lateral Restraint Assemblies**

Lateral restraint assemblies must be (1) constructed from commercial quality steel components complying with section 75-1.02, (2) adjustable, and (3) able to resist a horizontal force of 10 percent of the contributory dead load.

**20-2.14C(3) Construction**

Each ductile iron pipe must be connected and fully extended (pulled out) after joint assembly before the next pipe section is added.

Install flange insulating gaskets on the outside flange of seismic expansion assemblies and expansion assemblies.

**20-2.14C(4) Payment**

Supply line on structures is paid for as supply line (bridge).

**20-2.15 TEMPORARY IRRIGATION SYSTEMS**

Reserved

**20-2.16–20-2.19 RESERVED**

**20-3 PLANTING**

**20-3.01 GENERAL**

**20-3.01A General**

**20-3.01A(1) Summary**

Section 20-3 includes specifications for performing planting work in new and existing landscapes.

**20-3.01A(2) Definitions**

Reserved

**20-3.01A(3) Submittals**

**20-3.01A(3)(a) General**

Submit nursery invoices showing species or variety and inspection certificates for plants.

Submit documentation of clearance from the county agricultural commissioner for plants obtained from a county outside the project limits.

If a root stimulant is required, submit a copy of the root stimulant manufacturer's product sheet and instructions for the application of the root stimulant.

If cuttings are to be taken from outside the right-of-way, submit proof of permits and payment of associated fees. Notify the Engineer of the location at least 15 days before taking cuttings.

**20-3.01A(3)(b) Vendor Statements**

At least 60 days before planting the plants, submit a statement from the vendor that the order for the plants required, including sample plants used for inspection, has been received and accepted by the vendor. The statement from the vendor must include the plant names, sizes, and quantities and the anticipated delivery date.

**20-3.01A(3)(c) Certificates of Compliance**

Submit a certificate of compliance for:

1. Sod
2. Soil amendment

**20-3.01A(4) Quality Control and Assurance**

Plants must comply with federal and state laws requiring inspection for diseases and infestations. Inspection certificates required by law must accompany each shipment of plants.

Obtain clearance from the county agricultural commissioner before planting plants delivered from a county outside the project limits.

The Engineer inspects the roots of container-grown sample plants by removing earth from the rootball of not less than 2 plants, nor more than 2 percent of the total number of plants of each species or variety. If container-grown plants are purchased from several sources, the Engineer inspects the roots of not less than 2 of each sample plant species or variety from each source. The rootball of container grown plants must not show evidence of being underdeveloped, deformed, or having been restricted.

If the Engineer finds noncompliant plants, the entire lot represented by the noncompliant sample plants will be rejected.

Cuttings with mature or brown stems and cuttings that have been trimmed will be rejected.

**20-3.01B Materials**

**20-3.01B(1) General**

Notify the Engineer at least 10 days before the plants are shipped to the job site.

**20-3.01B(2) Plants**

**20-3.01B(2)(a) General**

Plants must be the variety and size shown and true to the type or name shown. Plants must be individually tagged or tagged in groups identifying the plants by species or variety. Tagging is not required for cuttings.

Plants must be healthy, well-formed, not root-bound, free from insect pests and disease, and grown in nurseries inspected by the Department of Food and Agriculture.

The plants must comply with the size and type shown in the following table:

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

<sup>a</sup>Do not use containers made of biodegradable material.

<sup>b</sup>Grown in individual container cells.

<sup>c</sup>Bare root.

Trucks used for transporting plants must be equipped with covers to protect plants from windburn.

Handle and pack plants in an authorized way for the species or variety.

### **20-3.01B(2)(b) Cuttings**

#### **20-3.01B(2)(b)(i) General**

Take cuttings at random from healthy, vigorous plants. Make cuts with sharp, clean tools. Do not take more than 25 percent of an individual plant and not more than 50 percent of the plants in an area.

Keep cuttings covered and wet until planted. Do not allow cuttings to dry or wither.

Plant cuttings no more than 2 days after being cut.

#### **20-3.01B(2)(b)(ii) *Carpobrotus* and *Delosperma* Cuttings**

You may take cuttings for new *Carpobrotus* and *Delosperma* groundcover from the existing highway planting areas, but these areas may not provide enough material to complete the work. Contact the local District's encroachment permit office to obtain a permit to harvest cuttings, identify acceptable cutting harvest areas, and to determine acceptable quantities to take.

Take tip cuttings from healthy, vigorous *Carpobrotus* and *Delosperma* plants that are free of pests and disease.

*Carpobrotus* cuttings must be 10 inches or more in length and not have roots.

*Delosperma* cuttings must be 6 inches or more in length and not have roots.

#### **20-3.01B(2)(b)(iii) Willow Cuttings**

Take willow cuttings from areas shown or designated by the Engineer.

Willow cuttings must be:

1. Reasonably straight
2. 20 to 24 inches in length
3. 3/4 to 1-1/2 inch in diameter at the base of the cutting

Cut the top of each willow cutting square above a leaf bud. Cut the base below a leaf bud at approximately a 45 degree angle. Trim off leaves and branches flush with the stem of the cutting.

#### **20-3.01B(2)(b)(iv) Cottonwood Cuttings**

Cottonwood cuttings must comply with the requirements for willow cuttings in section 20-3.01B(2)(b)(iii).

#### **20-3.01B(2)(b)(v)–20-3.01B(2)(b)(viii) Reserved**

#### **20-3.01B(2)(c) Sod**

Sod must:

1. Be grown to comply with the Food & Agri Code
2. Be free from weeds and undesirable types of grasses and clovers
3. Be field-grown on soil containing less than 50 percent silt and clay
3. Have less than 1/2-inch-thick thatch
4. Not be less than 8 months or more than 16 months old
5. Be machine-cut to a uniform soil thickness of  $5/8 \pm 1/4$  inch, not including top growth and thatch

Protect sod with tarps or other protective covers during delivery. Do not allow sod to dry out during delivery or before placement.

#### **20-3.01B(3) Soil Amendment**

Soil amendment must comply with the requirements in the Food & Agri Code. Soil amendment must be one or a combination of the following:

1. Sphagnum peat moss
2. Nitrolized fir bark
3. Vermiculite
4. Perlite

**20-3.01B(4) Fertilizers**

**20-3.01B(4)(a) General**

Deliver fertilizer in labeled containers showing weight, chemical analysis, and manufacturer's name.

Fertilizer must comply with the requirements of the Food & Agri Code.

**20-3.01B(4)(b) Slow-release Fertilizers**

Slow-release fertilizer must be a pelleted or granular form with a nutrient release over an 8 to 12 month period and must comply with the chemical analysis ranges shown in the following table:

Ingredient	Content (percent)
Nitrogen (N)	16–21
Phosphoric acid (P)	6–8
Water soluble potash (K)	4–10

**20-3.01B(4)(c) Packet Fertilizers**

Packet fertilizer must be a biodegradable packet with a nutrient release over a 12 month period. Each packet must have a weight of 10 ± 1 grams and must comply with the chemical analysis shown in the following table:

Ingredient	Content (percent)
Nitrogen(N)	20
Phosphoric acid (P)	10
Water soluble potash (K)	5

**20-3.01B(4)(d) Organic Fertilizers**

Organic fertilizer must be pelleted or granular with a cumulative nitrogen release rate of no more than 70 percent for the first 70 days after incubation at 86 degrees F with 100 percent at 350 days or more. Organic fertilizer must comply with the chemical analysis shown in the following table:

Ingredient	Content (percent)
Nitrogen (N)	5–7
Phosphoric acid (P)	1–5
Water soluble potash (K)	1–10

**20-3.01B(5) Root Stimulants**

Root stimulant must be a commercial quality product.

**20-3.01B(6) Plaster Sand**

Backfill material for the transplant palm tree planting holes must be 100 percent commercial quality washed plaster sand.

**20-3.01B(7) Root Barrier**

Root barrier must be an injection molded or extruded modular panel made of high-density polypropylene or polyethylene plastic.

Each panel must:

1. Be at least 1/16-inch thick
2. Have at least 4 molded root-deflecting vertical ribs 0.5- to 0.8-inch wide, 6 to 8 inches apart
3. Have a locking strip or an integral male-female sliding lock designed to resist slippage between panels
4. Be at least 2 feet wide and 2 feet in depth

### **20-3.01B(8) Root Protectors**

Each root protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Closed bottom design with a height and diameter that provides a minimum of 6 inches of clearance between the root ball and the sides and bottom of the wire cylinder

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points.

### **20-3.01B(9) Foliage Protectors**

Each foliage protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Approximately 4 feet high and 2 feet in diameter

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points. Other wire edges that are cut must be free of sharp points.

Support stakes must be one of the following:

1. 3/4-inch reinforcing steel bar a minimum of 5 feet long with an orange or red plastic safety cap that fits snugly onto the top of the reinforcing steel bar
2. 2 inch nominal diameter or 2 by 2 inch nominal size wood stakes a minimum of 5 feet long. Wood stakes must be straight

The jute mesh cover must comply with section 21-1.02O(2). Twine required to hold the jute mesh cover in place must be 1/8-inch diameter manila hemp twine.

### **20-3.01B(10) Wood Plant Stakes**

Each plant stake must be nominal 2 by 2 inch or nominal 2-inch diameter and of sufficient length to keep the plant in an upright position.

Plant stakes for vines must be nominal 1 by 1 inch, 18 inches long.

### **20-3.01B(11) Plant Ties**

Plant ties must be extruded vinyl-based tape, 1 inch wide and at least 10 mils thick.

## **20-3.01C Construction**

### **20-3.01C(1) General**

Apply a root stimulant under the manufacturer's instructions to the plants specified in the special provisions.

Before transporting the plants to the planting area, thoroughly wet the root ball.

### **20-3.01C(2) Pruning**

Prune plants under the latest edition of ANSI A300 part 1, *Pruning*, published by the Tree Care Industry Association.

Do not use tree seal compounds to cover pruning cuts.

### **20-3.01C(3) Watering**

Water existing plants to be maintained, transplanted trees, and new plants as needed to keep the plants in a healthy growing condition.

### **20-3.01C(4) Replacement Plants**

Plants that show signs of failure to grow at any time or are so injured or damaged as to render them unsuitable for the purpose intended, must be removed, replaced, and replanted. Replace unsuitable plants within 2 weeks after the Engineer marks or indicates that the plants must be replaced.

Replacement planting must comply with the original planting requirements, spacing, and size provisions described for the plants being replaced.

Replacement planting for transplanted trees must comply with the work plan and be planted in the same planting hole.

Replacement ground cover plants must be the same species specified for the ground cover being replaced. Other replacement plants must be the same species as the plants being replaced.

Place orders for replacement plants with the vendor at the appropriate time so that the replacement plants are not in a root-bound condition.

The Department does not pay for replacement plants or the planting of replacement plants.

#### **20-3.01C(5) Maintain Plants**

Maintain plants from the time of planting until Contract acceptance if no plant establishment period is specified or until the start of the plant establishment period.

#### **20-3.01D Payment**

Reserved

### **20-3.02 EXISTING PLANTING**

#### **20-3.02A General**

##### **20-3.02A(1) Summary**

Section 20-3.02 includes specifications for pruning existing plants, transplanting trees, and maintaining existing planted areas.

Transplant palm trees between March 15 and October 15.

##### **20-3.02A(2) Definitions**

Reserved

##### **20-3.02A(3) Submittals**

Submit a work plan for:

1. Transplanting trees. The work plan must include methods for lifting, transporting, storing, planting, guying, and maintaining each tree to be transplanted. Include root ball size, method of root ball containment, and a maintenance program for each tree.
2. Maintaining existing planted areas. The work plan must include weed control, fertilization, mowing and trimming of turf areas, watering, and controlling rodents and pests.

Submit a copy of the manufacturer's product sheet for root stimulant including application instructions.

##### **20-3.02A(4) Quality Control and Assurance**

Inspect for deficiencies of existing planted areas in the presence of the Engineer. Complete the inspection within 15 days after the start of job site activities.

Deficiencies requiring corrective action include:

1. Weeds
2. Dead, diseased, or unhealthy plants
3. Missing plant stakes and tree ties
4. Inadequate plant basins and basin mulch
5. Other deficiencies needing corrective action to promote healthy plant life
6. Rodents and pests

#### **20-3.02B Materials**

Not Used

#### **20-3.02C Construction**

##### **20-3.02C(1) General**

Correct deficiencies of existing planted areas as ordered within 15 days of the order. Correction of deficiencies is change order work.

After deficiencies are corrected, perform work to maintain existing planted areas in a neat and presentable condition and to promote healthy plant growth through Contract acceptance.

### **20-3.02C(2) Prune Existing Plants**

Prune existing plants as shown.

If no bid item for prune existing plants is included, prune existing plants as ordered. Pruning existing plants is change order work.

### **20-3.02C(3) Transplant Trees**

Prune each tree to be transplanted immediately before lifting.

If the tree to be transplanted is a palm, prune by removing dead fronds and frond stubs from the trunk. Remove green fronds up to 2 rows of fronds away from the center of growth. Tie the remaining 2 rows of fronds in an upright position with light hemp or manila rope. Remove fronds and frond stubs at the trunk in a manner that will not injure the trunk. Remove fronds and frond stubs for *Phoenix dactylifera* (Date Palm) approximately 4 inches from the trunk.

Prepare each hole in the new location before lifting the tree to be transplanted.

Lift tree to be transplanted as described in the work plan.

Comply with section 20-3.03C(3) for handling and planting each tree to be transplanted.

Until replanted, cover exposed root ball with wet burlap or canvas and cover the crown with 90 percent shade cloth.

Replant each tree on the same day it is lifted if possible. If the transplant location is not ready to receive the tree, store and maintain the tree to be transplanted until the transplant location is authorized. Store tree in an upright position.

Replace damaged transplanted tree under 20-3.01C(4) and with the number of trees specified in the special provisions.

The replacement trees must be planted in individual plant holes at the location determined by the Engineer within the area of the tree being replaced. Comply with section 20-3.03C(2) for the planting of the replacement trees.

### **20-3.02C(4) Maintain Existing Planted Areas**

If a bid item for maintain existing planted areas is included, the existing plant basins must be kept well-formed and free of sediment. If the existing plant basins need repairs, and the basins contain mulch, replace the mulch after the repairs are done.

Control weeds within the existing planted area and:

1. From the existing planted area limit to the adjacent edges of paving and fences if less than or equal to 12 feet
2. From the existing planted area limit to 6 feet beyond the outer limit of the existing planted area if the adjacent edge of paving or fence is more than 12 feet away
3. Within a 3-foot radius from each existing tree and shrub

If no bid item for maintain existing planted areas is included, maintain existing planted areas as ordered. Maintain existing planted areas is change order work.

### **20-3.02D Payment**

Not Used

## **20-3.03 PLANTING WORK**

### **20-3.03A General**

Section 20-3.03 includes specifications for planting plants.

### **20-3.03B Materials**

Not Used

### **20-3.03C Construction**

#### **20-3.03C(1) General**

Do not begin planting until authorized.

If an irrigation system is required, do not begin planting in an area until the functional test has been completed and authorized for the irrigation system serving that area.

#### **20-3.03C(2) Preparing Planting Areas**

The location of each plant is as shown unless the Engineer designates otherwise. If the Engineer designates the location, it will be marked by a stake, flag, or other marker.

Conduct work so the existing flow line in drainage ditches is maintained. Material displaced by your operations that interferes with drainage must be removed.

Where a minimum distance to a drainage ditch is shown, locate the plant so that the outer edge of its basin wall is at least the minimum distance shown for each plant involved.

Excavate each planting hole by hand digging or by drilling. The bottom of each planting hole must be flat. Do not use water for excavating the hole.

Unless a larger planting hole is specified, the planting hole must be large enough to receive the root ball or the total length and width of roots, backfill, amendments, and fertilizer. Where rock or other hard material prohibits the hole from being excavated, a new hole must be excavated and the abandoned hole backfilled.

#### **20-3.03C(3) Planting Plants**

##### **20-3.03C(3)(a) General**

Do not plant plants in soil that is too wet, too dry, not properly conditioned as specified, or in an unsatisfactory condition for planting.

Do not distribute more plants than can be planted and watered on that day.

Water plants immediately after planting. Apply water until the backfill soil around and below the roots or ball of earth around the roots of each plant is thoroughly saturated. When watering with a hose, use a nozzle, water disbursement device, or pressure reducing device. Do not allow the full force of the water from the open end of the hose to fall within the basin around any plant. Groundcover plants in areas with an irrigation system must be watered by sprinklers. Several consecutive watering cycles may be necessary to thoroughly saturate the soil.

If shown, install root barriers between trees and concrete sidewalk or curb. Install panels flush with finished grade and join with locking strips or integral male-female sliding locks. Install barriers with root deflectors facing inward.

If a tree grate is shown, install root barrier panels 0.5 inch above finish grade or as shown.

Adjust planting locations so that each tree or shrub is at least 8 feet away from any sprinkler.

Where a tree, shrub, or vine is to be planted within a groundcover area or cutting planting area, plant it before planting groundcover or cuttings.

Where shrubs and groundcovers are shown to be planted in groups, the outer rows directly adjacent to the nearest roadway or highway fence must be parallel to the nearest roadway or highway fence. Stagger shrubs and groundcovers in adjacent rows. Adjust the alignment of the plants within the outer rows.

Core holes in concrete masonry block wall as shown.

Where a vine is to be planted against a wall or fence, plant it as close as possible to the wall or fence. If a vine planted next to a wall is to be staked, stake and tie the vine at the time of planting. A vine planted next to a fence must be tied to the fence at the time of planting.

Protect tree trunks from injury. Do not:

1. Drag tree
2. Use chains to move a tree
3. Lay tree on the ground

### **20-3.03C(3)(b) Trees, Shrubs, and Vines**

After preparing holes, thoroughly mix soil amendment and granular fertilizer at the rate shown with native soil to be used as backfill material. Remove containers from plants in such a manner that the ball of earth surrounding the roots is not broken. Do not cut plant containers before delivery of the plants to the planting area. Plant and water plants immediately after removal from their containers.

Place packet fertilizer in the backfill within 6 to 8 inches of the ground surface and approximately 1 inch from the root ball. If more than 1 packet is required per plant, distribute the packets evenly around the root ball.

If a root stimulant is to be used, apply it according to the manufacturer's instructions.

If required, install root protectors in the plant holes as shown.

Ensure roots are not restricted or distorted.

Distribute backfill uniformly throughout the entire depth of the plant hole without clods or lumps. After the planting holes have been backfilled, jet water into the backfill with a pipe or tube inserted into the bottom of the hole until the backfill material is saturated for the full depth. If the backfill material settles below this level, add additional backfill to the required level. If a plant settles deeper than shown, replant it at the required level.

Remove nursery stakes after planting.

Install 2 plant stakes for each plant to be staked at the time of planting as shown. Ensure the rootball is not damaged.

Tie the plant to the stakes with 2 plant ties, 1 tie to each stake. Each tie must form a figure 8 by crossing the tie between the plant and the stake as shown. Install ties at the lowest position that will support the plant in an upright position. Ties must provide trunk flexibility but not allow the trunk to rub against the stakes. Wrap each end of the tie 1-1/2 turns around the stake and securely tie.

Construct a watering basin around each plant as shown.

If required, install a foliage protector:

1. Over the plant within 2 days after planting.
2. Vertically and centered over the plant as shown

If foliage protectors are required:

1. Cut the bottom of the wire cylinder to match the slope of the ground. Do not leave sharp points of wire after cutting. Sharp points must be bent over or blunted.
2. Install 2 support stakes for foliage protectors vertically and embed in the soil on opposite sides of the plant as shown and in a transverse direction to the prevailing wind.
3. Either weave the support stakes through the wire cylinder mesh at 6 inch maximum centers or fasten the wire cylinder to the support stakes at 6 inch maximum centers.
4. Wire cylinder must be snug against the support stakes but loose enough to be raised for pesticide application or to perform weeding within the plant basin.
5. Install jute mesh cover over the foliage protector and secure with twine as shown.

### **20-3.03C(3)(c) Groundcover Plants**

Each groundcover planting area irrigated by a single control valve must be completely planted and watered before planting other groundcover planting areas.

Plant groundcover plants in moist soil, and in neat, straight rows, spaced as shown.

Apply fertilizer to groundcover plants and water into the soil immediately after planting.

### **20-3.03C(3)(d) Cuttings, Liners, Plugs, and Seedling Plants**

#### **20-3.03C(3)(d)(i) General**

Apply fertilizer to cuttings, liners, plugs, and seedling plants and water immediately after planting.

Ensure the soil is moist to a minimum depth of 8 inches before planting cuttings.

If a root stimulant is to be used, apply it according to the manufacturer's instructions.

#### **20-3.03C(3)(d)(ii) Willow Cuttings**

Unless otherwise shown, for willow cuttings excavate planting holes perpendicular to the ground line by using a steel bar, auger, post hole digger, or similar tools. Holes must be large enough to receive the cuttings and fertilizer packet. Plant willow cuttings to the specified depths without damaging the bark.

Where rock or other hard material prohibits the excavation of the planting holes, excavate new holes and backfill the unused holes.

Plant willow cuttings during the period specified in the special provisions.

Apply root stimulant according to the manufacturer's instructions.

Plant the base of the cutting 10 to 12 inches deep with 3 to 5 bud scars exposed above the ground. If more than 5 bud scars are exposed, trim off the excess willow cutting length.

Place 1 fertilizer packet in the backfill of each cutting, 6 to 8 inches below the ground surface and approximately 1 inch from the cutting.

Backfill the plant holes with excavated material after planting. Distribute the excavated material evenly within the hole without clods, lumps, or air pockets. Compact the backfill so that the cutting cannot be easily removed from the soil. Do not damage the cutting's bark.

Dispose of trimmings and unused cuttings.

#### **20-3.03C(3)(d)(iii) Cottonwood Cuttings**

Reserved

#### **20-3.03C(3)(d)(iv) *Carpobrotus* and *Delosperma* Cuttings**

Plant *Carpobrotus* cuttings to a depth so that not less than 2 nodes are covered with soil. The basal end of *Delosperma* cuttings must not be less than 2 inches below the surface of the soil and the basal end of *Carpobrotus* cuttings must not be less than 4 inches below the surface of the soil.

Apply root stimulant to *Delosperma* cuttings before planting.

Do not plant *Carpobrotus* or *Delosperma* cuttings in soil that does not contain sufficient moisture at an average depth of 2 inches below the surface.

#### **20-3.03C(3)(d)(v) Liner Plants**

Plant liner plants during the period specified in the special provisions.

If a foliage protector is required, install under section 20-3.03C(3)(b).

#### **20-3.03C(3)(d)(vi) Plug Plants**

Plant plug plants during the period specified in the special provisions.

#### **20-3.03C(3)(d)(vii) Seedling Plants**

Plant seedling plants during the period specified in the special provisions.

#### **20-3.03C(3)(e) Sod**

After all other planting is performed, grade sod areas to drain and to a smooth and uniform surface. Fine grade and roll sod areas before placing sod.

Areas adjacent to sidewalks, edging, and other paved borders and surfaced areas must be 1 inch below the finished surface elevation of the facilities, after fine grading, rolling, and settlement of the soil.

Place sod such that the end of each adjacent strip is staggered a minimum of 2 feet. Place the edge and end of sod firmly against adjacent sod and against sidewalks, edging, and other paved borders and surfaced areas.

Lightly roll the entire sodded area to eliminate air pockets and ensure close contact with the soil after placement of sod. Water the sodded areas so that the soil is moist to a minimum depth of 4 inches after rolling. Do not allow the sod to dry out.

If irregular or uneven areas appear in the sodded areas, restore to a smooth and even appearance.

Trim sod to a uniform edge at sidewalks, edging, and other paved borders and surfaced areas. Trimming must be repeated whenever the edge of sod extends 1 inch beyond the edge of the edging, sidewalks, and other paved borders and surfaced areas. Remove and dispose of trimmed sod.

Mow sod when it has reached a height of 4 inches. Mow sod to a height of 2.5 inches.

### **20-3.03D Payment**

Soil amendment is measured in the vehicle at the point of delivery.

Measurement for slow-release fertilizer, organic fertilizer, or iron sulfate is determined from marked weight or sack count.

Various sizes and types of plants are measured by either the product of the average plant density and the total area planted or by actual count of the living plants in place, determined by the Engineer. The average plant density is the number of living plants per sq yd determined from actual count of test areas chosen representing the total planted area. The size and location of the test areas is determined by you and the Engineer, except that the total area tested must be equal to not less than 3 percent nor more than 5 percent of the planted area being determined. The Engineer makes the final determination of the areas to be tested.

### **20-3.04–20-3.08 RESERVED**

## **20-4 PLANT ESTABLISHMENT WORK**

### **20-4.01 GENERAL**

#### **20-4.01A Summary**

Section 20-4 includes specifications for performing plant establishment work.

Plant establishment consists of caring for the plants, including watering, fertilizing, pruning, replacing damaged plants, pest control, and operating and repairing of all existing irrigation facilities used and irrigation facilities installed as part of the new irrigation system.

Working days on which no work is required, as determined by the Engineer, will be credited as a plant establishment working day, regardless of whether or not you perform plant establishment work.

Working days whenever you fail to adequately perform plant establishment work will not be credited toward the plant establishment working days.

#### **20-4.01B Definitions**

**Type 1 plant establishment:** Plant establishment period with the number of working days specified for plant establishment beginning after all work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance.

**Type 2 plant establishment:** Plant establishment period with the number of working days specified for plant establishment beginning after all planting work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance, provided that the Contract must not be accepted unless the plant establishment work has been satisfactorily performed for at least the number of working days specified for plant establishment.

If maintenance and protection relief is granted for a completed portion of the work under section 5-1.38, Type 2 plant establishment period for the completed portion of the work is the time between

completion of all planting work except for plant establishment work, and the granting of maintenance and protection relief, provided that the relief must not be granted unless the plant establishment work in the completed portion of the work has been satisfactorily performed for at least the number of working days specified for the plant establishment period.

#### **20-4.01C Submittals**

##### **20-4.01C(1) General**

Submit seasonal watering schedules for use during the plant establishment period within 10 days after the start of the plant establishment period. Remote irrigation control system watering schedule must utilize the remote irrigation control system software program.

Submit updated watering schedules within 5 business days after any changes have been made to the authorized schedules.

Submit a revised watering schedule for each irrigation controller not less than 30 days before completion of the plant establishment period.

##### **20-4.01C(2) Notification**

The Engineer will notify you in writing when the plant establishment period begins and will furnish statements regarding the number of working days credited to the plant establishment period after the notification.

Notify the Engineer at least 5 business days before applying each application of fertilizer.

#### **20-4.01D Quality Control and Assurance**

Provide training by a qualified person on the use and adjustment of the irrigation controllers installed, 30 days before completion of the plant establishment period.

Perform a final inspection of the plant establishment work in the presence of the Engineer between 20 and 30 days before Contract acceptance.

#### **20-4.02 MATERIALS**

##### **20-4.02A General**

Reserved

##### **20-4.02B Fertilizers**

Fertilizer must comply with section 20-3.01B(5).

#### **20-4.03 CONSTRUCTION**

##### **20-4.03A General**

Remove trash and debris.

Surplus earth accumulated in roadside clearing and planting areas must be removed.

Trim and mow turf areas as specified for sod in section 20-3.03C(3)(e). Dispose of trimmed and mowed material.

If irregular or uneven areas appear within turf areas, restore to a smooth and even appearance. Reseed turf seed areas.

Remove the tops of foliage protectors if plants become restricted.

Remove foliage protectors, including support stakes, within 30 days before the completion of the plant establishment period.

Keep plant basin walls well formed.

Clean new wye strainers and existing wye strainers that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

Remove, clean, and reinstall new filters and existing filters that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

**20-4.03B Plant Growth Control**

Prune plants planted as part of the Contract as authorized.

Remove plant growth that extends within 2 feet of sidewalks, curbs, dikes, shoulders, walls or fences.

Remove proposed and existing ground cover from within the plant basins, including basin walls, turf areas, and planting areas within edging.

Vines next to walls and fences must be kept staked and tied. Train vines on fences and walls or through cored holes in walls.

**20-4.03C Fertilizers**

Apply fertilizer to the plants as specified and water into the soil after each application.

Apply fertilizer at the rates shown and spread with a mechanical spreader, whenever possible.

**20-4.03D Weed Control**

Control weeds under section 20-1.03C(3).

**20-4.03E Plant Staking**

Replace the plant stakes that are inadequate to support plants with larger stakes.

Remove plant stakes when the Engineer determines they are no longer needed.

**20-4.03F Replacement Plants**

Replacement plants must comply with section 20-3.01C(4).

Replacement of plants up to and including the 125th plant establishment working day must be with a plant of the same size as originally specified. Plants of a larger container size than those originally specified for replacement plants may be used during the first 125 working days of the plant establishment period.

Replacement of plants after the 125th plant establishment working day must comply with the following size requirements:

Plant size (Original)	Plant size (Replacement)
Pot/liner/plug/seedling	No. 1 container
No. 1 container	No. 5 container
No. 5 container	No. 15 container

Other replacement plants must be the same size as originally specified.

Replacement ground cover plants must comply with the following spacing requirements:

Original spacing (inches)	On center spacing of replacement ground cover plants (inches)		
	Number of completed plant establishment working days		
	1–125	126–190	191–End of plant establishment period
9	9	6	6
12	12	9	6
18	18	12	9
24	24	18	12
36	36	24	18

**20-4.03G Watering**

Operate the electric automatic irrigation systems in the automatic mode unless authorized.

If any component of the electric automatic irrigation system is operated manually, the day will not be credited as a plant establishment working day unless the manual operation is authorized.

Water plants utilizing the remote irrigation control system software program unless authorized.

Implement the watering schedule at least 10 days before completion of the plant establishment period.

**20-4.04 PAYMENT**

Not Used

**20-5 LANDSCAPE ELEMENTS**

**20-5.01 GENERAL**

**20-5.01A General**

Section 20-5 includes specifications for constructing and installing landscape elements.

**20-5.01B Materials**

Not Used

**20-5.01C Construction**

Earthwork must comply with section 19.

**20-5.01D Payment**

Not Used

**20-5.02 EDGING**

**20-5.02A General**

Section 20-5.02 includes specifications for constructing landscape edging.

**20-5.02B Materials**

**20-5.02B(1) General**

Reserved

**20-5.02B(2) Header Board Edging**

Lumber for header board edging must be one of the following types:

1. Construction grade cedar
2. Pressure-treated Douglas fir
3. Construction heart grade redwood complying with section 57-2.01B(2)

Lumber must be:

1. Rough cut from sound timber.
2. Straight. Sweep must not exceed 1 inch in 6 feet.
3. Free from loose or unsound knots. Knots must be sound, tight, well spaced, and not to exceed 2 inches in size on any face.
4. Free of shakes in excess of 1/3 the thickness of the lumber.
5. Free of splits longer than the thickness of the lumber.
6. Free of other defects that would render the lumber unfit structurally for the purpose intended.

Edging anchors for header board edging must be stakes of the size and shape shown.

#### **20-5.02B(3) Metal Edging**

Metal edging must be commercial quality, made of aluminum or steel, and have an L-shaped design. Edging must be a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for the use intended.

Edging anchors must be from the same manufacturer as the metal edging.

#### **20-5.02B(4) High Density Polyethylene Edging**

HDPE edging must be commercial quality and a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for commercial installation for the use intended.

Edging anchors must be from the same manufacturer as HDPE edging.

#### **20-5.02B(5) Concrete Edging**

Concrete for edging must be minor concrete.

#### **20-5.02B(6)–20-5.02B(10) Reserved**

#### **20-5.02C Construction**

##### **20-5.02C(1) General**

Where edging is used to delineate the limits of inert ground cover or mulch areas, install edging before installing inert ground cover or mulch areas.

Saw cut surfaces where (1) asphalt concrete or concrete surfacing must be removed to permit the installation of edging and (2) no joint exists between the surfacing to be removed and the surfacing to remain in place. The surfacing must be cut in a straight line to a minimum depth of 2 inches with a power-driven saw before the surfacing is removed. Spike or stake spacing must comply with the manufacturer's instructions for use and site conditions.

##### **20-5.02C(2) Header Board Edging**

Each stake must be driven flush with the top edge of the header board edging and the stake top must be beveled away from the header board at a 45 degree angle. Attach stake to header board with a minimum of two 12-penny hot dipped galvanized nails per stake.

##### **20-5.02C(3) Metal and High Density Polyethylene Edging**

Spike or stake spacing must comply with the manufacturer's instructions for use and site conditions.

##### **20-5.02C(4) Concrete Edging**

Construct and finish minor concrete edging under section 73-2.

##### **20-5.02C(5)–20-5.02C(9) Reserved**

#### **20-5.02D Payment**

Edging is measured parallel to the ground surface.

### **20-5.03 INERT GROUND COVERS AND MULCHES**

#### **20-5.03A General**

##### **20-5.03A(1) General**

##### **20-5.03A(1)(a) Summary**

Section 20-5.03 includes specifications for installing inert ground covers and mulches.

### **20-5.03A(1)(b) Definitions**

Reserved

### **20-5.03A(1)(c) Submittals**

Submit:

1. Filter fabric product data including the manufacturer's product sheet and installation instructions
2. Certificate of compliance for filter fabric at least 5 business days before delivery of the material to the job site

### **20-5.03A(1)(d) Quality Control and Assurance**

Reserved

### **20-5.03A(2) Materials**

Soil sterilant must be oxadiazon granular preemergent and must comply with section 20-1.02C.

Filter fabric must be Class A. Staples for filter fabric must comply with section 21-1.02R.

### **20-5.03A(3) Construction**

#### **20-5.03A(3)(a) General**

Before performing inert ground cover and mulch work, remove plants and weeds to ground level.

#### **20-5.03A(3)(b) Earthwork**

Excavate areas to receive inert ground cover or mulch to the depth shown. Maintain the planned flow lines, slope gradients, and contours of the job site. Grade subgrade to a smooth and uniform surface and compact to not less than 90 percent relative compaction.

#### **20-5.03A(3)(c) Treatment of Soil**

After compaction, apply soil sterilant at the maximum label rate. Do not apply soil sterilant more than 12 inches beyond the inert ground cover or mulch limits. The soil sterilant application and inert ground cover or mulch placement must be completed within the same work day.

#### **20-5.03A(3)(d) Filter Fabric**

Immediately before placing filter fabric, surfaces to receive filter fabric must be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Align fabric and place in a wrinkle-free manner.

Overlap adjacent rolls of the fabric from 12 to 18 inches. Spread each overlapping roll in the same direction. Fasten fabric with staples flush with the adjacent fabric to prevent movement of fabric by placement of inert ground cover or mulch.

Repair or replace fabric damaged during placement of inert ground cover or mulch with sufficient fabric to comply with overlap requirements.

### **20-5.03A(4) Payment**

Not Used

### **20-5.03B Rock Blanket**

#### **20-5.03B(1) General**

##### **20-5.03B(1)(a) Summary**

Section 20-5.03B includes specifications for placing rock blanket.

##### **20-5.03B(1)(b) Definitions**

Reserved

##### **20-5.03B(1)(c) Submittals**

Submit a 1 sq yd sample of the various rock sizes.

**20-5.03B(1)(d) Quality Control and Assurance**

Reserved

**20-5.03B(2) Materials**

**20-5.03B(2)(a) General**

Do not use filter fabric.

**20-5.03B(2)(b) Concrete**

Concrete must be minor concrete.

**20-5.03B(2)(c) Rock**

Rock must be clean, smooth, and obtained from a single source and must comply with the following grading requirements:

**Grading Requirements**

Screen size (inches)	Percentage passing
8	100
6	50-85
4	0-50

**20-5.03B(2)(d) Mortar**

Mortar must comply with section 51-1.02F.

**20-5.03B(3) Construction**

Place concrete as shown.

Rock must be placed while concrete is still plastic. Remove concrete adhering to the exposed surfaces of the rock.

Loose rocks or rocks with a gap greater than 3/8 inch must be reset by an authorized method. The rock gap is measured from the edge of the rock to the surrounding concrete bedding.

Place mortar as shown.

**20-5.03B(4) Payment**

Rock blanket is measured parallel to the rock blanket surface.

**20-5.03C Gravel Mulch**

**20-5.03C(1) General**

**20-5.03C(1)(a) Summary**

Section 20-5.03C includes specifications for placing gravel mulch.

**20-5.03C(1)(b) Definitions**

Reserved

**20-5.03C(1)(c) Submittals**

Submit a 5-lb sample of the gravel mulch.

**20-5.03C(1)(d) Quality Control and Assurance**

Reserved

**20-5.03C(2) Materials**

Gravel mulch must be:

1. Uniform gray color
2. From a single source only
3. Crushed rock that complies with the following grading requirements:

### Grading Requirements

Sieve size	Percent passing
1-1/4 inch	100
3/4 inch	60-80
1/2 inch	45-65
No. 40	5-20

#### **20-5.03C(3) Construction**

Place gravel and compact by rolling.

The finished gravel mulch surface must be smooth and uniform, maintaining original flow lines, slope gradients, and contours of the job site.

#### **20-5.03C(4) Payment**

Gravel mulch is measured parallel to the gravel mulch surface.

#### **20-5.03D Decomposed Granite**

##### **20-5.03D(1) General**

##### **20-5.03D(1)(a) Summary**

Section 20-5.03D includes specifications for placing decomposed granite.

##### **20-5.03D(1)(b) Definitions**

Reserved

##### **20-5.03D(1)(c) Submittals**

Five business days before delivery of the materials to the job site, submit:

1. Solidifying emulsion product data including the manufacturers' product sheets and installation instructions
2. Certificate of compliance for solidifying emulsion
3. 5-lb sample of the decomposed granite

##### **20-5.03D(1)(d) Quality Control and Assurance**

Test plot must be:

1. Constructed at an authorized location
2. At least 3 by 12 feet
3. Constructed using the materials, equipment, and methods to be used in the work
4. Authorized before starting work

Notify the Engineer not less than 7 days before constructing the test plot.

The Engineer uses the authorized test plot to determine acceptability of the work.

If ordered, prepare additional test plots. Additional test plots are change order work.

If the test plot is not incorporated into the work, the Engineer may order you to remove it.

##### **20-5.03D(2) Materials**

##### **20-5.03D(2)(a) General**

Decomposed granite must be:

1. Uniform gray or tan color
2. From one source only
3. Crushed granite rock that complies with grading requirements shown in the following table:

### Grading Requirements

Sieve size	Percent passing
3/8 inch	100
No. 4	95–100
No. 8	75–80
No. 16	55–65
No. 30	40–50
No. 50	25–35
No. 100	20–25
No. 200	5–15

Note:

Grading based upon AASHTO T11-82 and T27-82

#### **20-5.03D(2)(b) Solidifying Emulsion**

Solidifying emulsion must be either a water-based polymer or nontoxic organic powdered binder specifically manufactured to harden decomposed granite. The solidifying emulsion must not alter the decomposed granite color.

#### **20-5.03D(3) Construction**

Do not place decomposed granite during rainy conditions.

Mix solidifying emulsion thoroughly and uniformly throughout the decomposed granite and under the manufacturer's instructions. Mix the material in the field using portable mixing equipment, or delivered in mixer trucks from a local ready-mixed plant.

Place decomposed granite uniformly in layers no more than 1-1/2 inch thick. Compact each layer of decomposed granite to a relative compaction of not less than 90 percent. Begin compaction within 6 to 48 hours of placement.

If the material was mixed in the field, apply an application of solidifying emulsion after compaction as recommended by the manufacturer. Prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

The finished decomposed granite surface must be smooth and uniform, compacted to a relative compaction of not less than 90 percent, maintaining original flow lines, slope gradients, and contours of the job site.

#### **20-5.03D(4) Payment**

Not Used

#### **20-5.03E Wood Mulch**

##### **20-5.03E(1) General**

##### **20-5.03E(1)(a) Summary**

Section 20-5.03E includes specifications for placing wood mulch.

##### **20-5.03E(1)(b) Definitions**

Reserved

##### **20-5.03E(1)(c) Submittals**

Submit a certificate of compliance for mulch.

Submit a 2 cu ft mulch sample with the mulch source listed on the bag and obtain approval before delivery of mulch to the job site.

##### **20-5.03E(1)(d) Quality Control and Assurance**

Reserved

### **20-5.03E(2) Materials**

#### **20-5.03E(2)(a) General**

Mulch must not contain more than 0.1 percent of deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues harmful to plant or animal life.

Do not use filter fabric.

#### **20-5.03E(2)(b) Tree Bark Mulch**

Tree bark mulch must be derived from cedar, Douglas fir, or redwood species.

Tree bark mulch must be ground so that at least 95 percent of the material by volume is less than 2 inches and no more than 30 percent by volume is less than 1 inch.

#### **20-5.03E(2)(c) Wood Chip Mulch**

Wood chip mulch must:

1. Be derived from clean wood
2. Not contain leaves or small twigs
3. Contain at least 95 percent wood chips by volume with average thickness of 1/16 to 3/8 inch in any direction and 1/2 to 3 inches in length

#### **20-5.03E(2)(d) Shredded Bark Mulch**

Shredded bark mulch must:

1. Be derived from trees
2. Be a blend of loose, long, thin wood, or bark pieces
3. Contain at least 95 percent wood strands by volume with average thickness of 1/8 to 1-1/2 inches in any direction and 2 to 8 inches in length

#### **20-5.03E(2)(e) Tree Trimming Mulch**

Tree trimming mulch must:

1. Be derived from chipped trees and may contain leaves and small twigs.
2. Contain at least 95 percent material by volume less than 3 inches and no more than 30 percent by volume less than 1 inch

#### **20-5.03E(2)(f)–20-5.03E(2)(j) Reserved**

#### **20-5.03E(3) Construction**

Spread mulch placed in areas outside of plant basins to a uniform thickness as shown.

Mulch must be placed at the rate described and placed in the plant basins or spread in areas as shown after the plants have been planted. Mulch placed in plant basins must not come in contact with the plant crown and stem.

Spread mulch from the outside edge of the proposed plant basin or plant without basin to the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings. If the proposed plant or plant without basin is 12 feet or more from the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings, spread the mulch 6 feet beyond the outside edge of the proposed plant basin or plant without basin.

Do not place mulch within 4 feet of:

1. Flow line of earthen drainage ditches
2. Edge of paved ditches
3. Drainage flow lines

#### **20-5.03E(4) Payment**

Mulch is measured in the vehicle at the point of delivery.

**20-5.03F–20-5.03J Reserved**

**20-5.04 RESERVED**

Reserved

**20-5.05 SITE FURNISHINGS**

**20-5.05A General**

Section 20-5.05 includes specifications for installing site furnishings.

**20-5.05B–20-5.05Z Reserved**

**20-5.06–20-5.10 RESERVED**

AA

**21 EROSION CONTROL**

07-19-13

**Replace ", bonded fiber matrix, and polymer-stabilized fiber matrix" in the 1st paragraph of section 21-1.01B with:**

and bonded fiber matrix

04-20-12

**Delete the last paragraph of section 21-1.02E.**

04-20-12

**Replace section 21-1.02F(2) with:**

**21-1.02F(2) Reserved**

04-20-12

**Replace "20-7.02D(1)" in the 1st paragraph of section 21-1.02H with:**

20-3.01B(4)

07-19-13

**Replace section 21-1.02J with:**

**21-1.02J Reserved**

04-20-12

**Replace the row for organic matter content in the table in the 4th paragraph of section 21-1.02M with:**

01-18-13

Organic matter content	TMECC 05.07-A Loss-on-ignition organic matter method (LOI) % dry weight basis	30–100
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Replace section 28-2 with:

07-19-13

## 28-2 LEAN CONCRETE BASE

### 28-2.01 GENERAL

#### 28-2.01A Summary

Section 28-2 includes specifications for constructing lean concrete base (LCB).

#### 28-2.01B Definitions

**coarse aggregate:** Aggregate retained on a no. 4 sieve.

**fine aggregate:** Aggregate passing a no. 4 sieve.

#### 28-2.01C Submittals

##### 28-2.01C(1) General

At least 25 days before field qualification, submit the name of your proposed testing laboratory.

At least 10 days before field qualification, submit:

1. Aggregate qualification test results
2. Proposed aggregate gradation
3. Mix design, including:
  - 3.1. Proportions
  - 3.2. Types and amounts of chemical admixtures
4. Optional notice stating intent to produce LCB qualifying for a transverse contraction joint waiver under section 28-2.03D

Submittals for cementitious material must comply with section 90-1.01C(3).

Submit QC test results within 24 hours of test completion.

##### 28-2.01C(2) Field Qualification

11-15-13

For each field qualification for each mix design, manufacture 12 specimens under ASTM C 31 and submit six of the specimens from 24 to 72 hours after manufacture. Use one batch for all 12 specimens.

07-19-13

Submit field qualification data and test reports including:

1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cu yd, the minimum is 5 cu yd
4. Type and source of ingredients used
5. Age and strength from compression strength results

Field qualification test reports must be signed by the official in responsible charge of the laboratory performing the tests.

#### 28-2.01D Quality Control and Assurance

##### 28-2.01D(1) General

Stop LCB activities and immediately notify the Engineer whenever:

1. Any quality control or acceptance test result does not comply with the specifications
2. Visual inspection shows noncompliant LCB

If LCB activities are stopped, before resuming activities:

1. Inform the Engineer of the adjustments you will make
2. Remedy or replace the noncompliant LCB

3. Obtain authorization

Molds for compressive strength testing under ASTM C 31 or ASTM C 192 must be 6 by 12 inches.

Quality control and assurance for cementitious materials and admixtures must comply with section 90-1.01D(1)

**28-2.01D(2) Aggregate Qualification Testing**

Qualify the aggregate for each proposed aggregate source and gradation. Qualification tests include (1) sand equivalent and (2) average 7-day compressive strength under ASTM C 39 on 3 specimens manufactured under ASTM C 192. The cement content for this test must be 300 lb/cu yd, and the 7-day average compressive strength must be at least 610 psi. Cement must be Type II portland cement under section 90-1.02B(2).

LCB must have from 3 to 4 percent air content during aggregate qualification testing.

**28-2.01D(3) Field Qualification Testing**

Before placing LCB, you must perform field qualification testing and obtain authorization for each mix design. Retest and obtain authorization for changes to authorized mixed designs.

Proposed mix designs must be field qualified before you place the LCB represented by those mix designs. Use an American Concrete Institute (ACI) certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

Notify the Engineer at least 5 days before field qualification. Perform field qualification within the job site or a location authorized by the Engineer.

Field qualification testing includes compressive strength, air content, and penetration or slump in compliance with the table titled "Quality Control Requirements."

Field qualification testing for compressive strength must comply with the following:

1. Manufacture 12 cylinders under ASTM C 31 from a single batch
2. Perform 3 tests; each test consists of determining the average compressive strength of 2 cylinders at 7 days under ASTM C 39
3. The average compressive strength for each test must be at least 530 psi

If you submitted a notice to produce LCB qualifying for a transverse contraction joint waiver, manufacture additional specimens and test LCB for compressive strength at 3 days. Prepare compressive strength cylinders under ASTM C 31 at the same time using the same material and procedures as the 7-day compressive strength cylinders except do not submit 6 additional test cylinders. The average 3-day compressive strength for each test must be not more than 500 psi.

**28-2.01D(4) Quality Control Testing**

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.

Perform quality control sampling, testing, and inspection throughout LCB production and placement. LCB must comply with the requirements for the quality characteristics shown in the following table:

### Quality Control Requirements

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement
Sand equivalent (min)	ASTM D 2419	1 per 500 cubic yards but at least 1 per day of production	18
Aggregate gradation	ASTM C 136		Note a
Air content (max, percent) <sup>b</sup>	ASTM C 231		4
Penetration (inches)	ASTM C 360		0 to 1-1/2 nominal <sup>c, d</sup>
Slump (inches)	ASTM C 143		0-3 nominal <sup>c, d</sup>
Compressive strength (min, psi at 7 days)	ASTM C 39 <sup>e</sup>		530
Compressive strength (max, psi at 3 days) <sup>f</sup>	ASTM C 39 <sup>e</sup>		500

<sup>a</sup> Comply with the table titled "Aggregate Grading" in section 28-2.02C.

<sup>b</sup> If no single test in the first 5 air content tests exceeds 1-1/2 percent, no further air content tests are required.

<sup>c</sup> Maximum penetration must not exceed 2 inches and maximum slump must not exceed 4 inches

<sup>d</sup> Test for either penetration or slump

<sup>e</sup> Prepare cylinders under ASTM C 31

<sup>f</sup> Only applicable if you (1) submitted a notice stating intent to produce LCB qualifying for a transverse contraction joint waiver and (2) successfully field qualified the LCB for 3-day compressive strength. Make cylinders at the same time using the same material and procedures as QC testing for 7-day compressive strength.

#### 28-2.01D(5) Acceptance Criteria

For acceptance, properties of LCB must comply with values shown in the following table:

#### Acceptance Criteria Testing

Property	Test method	Value
Compressive strength (min, psi at 7 days)	ASTM C 39 <sup>a</sup>	530 <sup>b</sup>

<sup>a</sup> Cylinders prepared under ASTM C 31

<sup>b</sup> A compressive strength test represents up to (1) 1,000 cu yd or (2) 1 day's production if less than 1,000 cu yd.

#### 28-2.02 MATERIALS

##### 28-2.02A General

Water must comply with section 90-1.02D.

The air content in LCB must not exceed 4 percent. If the aggregate used for LCB is produced from processed reclaimed asphalt concrete or other material that may cause the air content to exceed 4 percent, reduce the air content with an admixture.

A water-reducing chemical admixture may be used. Water-reducing chemical admixture must comply with ASTM C 494, Type A or Type F.

Air-entraining admixtures must comply with section 90-1.02E.

##### 28-2.02B Cementitious Material

Portland cement must comply with section 90-1.02B. Portland cement content must not exceed 300 lb/cu yd.

SCM must comply with section 90-1.02B except the equations for SCM content under 90-1.02B(3) do not apply.

For aggregate qualification testing, use Type II portland cement under section 90-1.02B(2) without SCM.

### 28-2.02C Aggregate

Aggregate must be clean and free from decomposed material, organic material, and other deleterious substances. Aggregate samples must not be treated with lime, cement, or chemicals before testing for sand equivalent.

Use either 1-1/2 inch or 1 inch grading. Do not change your selected aggregate grading without authorization.

When tested under ASTM C 136, the percentage composition by weight of the aggregate must comply with the grading requirements for the sieve sizes shown in the following table:

Sieve sizes	Aggregate Grading			
	Percentage passing			
	1-1/2" maximum		1" maximum	
	Operating range	Contract compliance	Operating range	Contract compliance
2"	100	100	--	--
1-1/2"	90-100	87-100	100	100
1"	--	--	90-100	87-100
3/4"	50-85	45-90	50-100	45-100
3/8"	40-75	35-80	40-75	35-80
No. 4	25-60	20-65	35-60	30-65
No. 30	10-30	6-34	10-30	6-34
No. 200	0-12	0-15	0-12	0-15

Aggregate must comply with the quality requirements shown in the following table:

Aggregate Quality			
Property	Test Method	Operating range	Contract compliance
Sand equivalent (min)	ASTM D 2419	21	18
Compressive strength (min, psi at 7 days)	ASTM C 192 ASTM C 39	--	610 at 300 lb/cu yd cement content

Note: Cement must be Type II portland cement under section 90-1.02B(2).

If the aggregate grading or the sand equivalent test results, or both comply with contract compliance requirements but not operating range requirements, you may continue placing LCB for the remainder of the work day. Do not place additional LCB until you demonstrate the LCB to be placed complies with the operating range requirements.

### 28-2.03 CONSTRUCTION

#### 28-2.03A General

Do not allow traffic or equipment on the LCB for at least 72 hours after the 1st application of the curing compound and completion of contraction joints. Limit traffic and equipment on the LCB to that is required for placing additional layers of LCB or paving.

#### 28-2.03B Subgrade

Immediately before spreading LCB, the subgrade must:

1. Comply with the specified compaction and elevation tolerance for the material involved
2. Be free from loose or extraneous material
3. Be uniformly moist

Areas of subgrade lower than the grade established by the Engineer must be filled with LCB. The Department does not pay for filling low areas of subgrade.

#### 28-2.03C Proportioning, Mixing, and Transporting

Proportion LCB under section 90-1.02F except aggregate does not have to be separated into sizes.

Mix and transport LCB under section 90-1.02G except the 5th and 7th paragraphs in section 90-1.02G(6) do not apply.

### **28-2.03D Placing**

Place LCB under section 40-1.03H(1) except the 3rd paragraph does not apply.

Unless otherwise described, construct LCB in minimum widths of 12 feet separated by construction joints. For LCB constructed monolithically in widths greater than 26 feet, construct a longitudinal contraction joint offset no more than 3 feet from the centerline of the width being constructed.

Contraction joints must comply with section 40-1.03D(3).

Construct transverse contraction joints in intervals that result in LCB areas where the lengths and widths are within 20 percent of each other. Measure the widths from any longitudinal construction or longitudinal contraction joints.

The Engineer waives the requirement for transverse contraction joints if you:

1. Submitted a notice under 28-2.01C(1)
2. Successfully field qualified LCB for 3-day compressive strength testing
3. Submit QC test results for 3-day compressive strength under section 28-2.01D(4).

If concrete pavement will be placed on LCB, construct longitudinal construction and longitudinal contraction joints in the LCB. Provide at least 1 foot horizontal clearance from planned longitudinal construction and longitudinal contraction joints in the concrete pavement.

Do not mix or place LCB when the atmospheric temperature is below 35 degrees F. Do not place LCB on frozen ground.

### **28-2.03E Finishing**

Place LCB under section 40-1.03H(4) or under section 40-1.03H(5) except where there are confined work areas and when authorized:

1. Spread and shape LCB using suitable powered finishing machines and supplement with hand work as necessary
2. Consolidate LCB using high-frequency internal vibrators within 15 minutes after LCB is deposited on the subgrade
3. Vibrate with care such that adequate consolidation occurs across the full paving width and do not use vibrators for extensive weight shifting of the LCB

For LCB to be paved with HMA, before curing operation texture the LCB finished surface by dragging a broom, burlap, or a spring steel tine device. If using a spring steel tine device, the device must produce a scored surface with scores parallel or transverse to the pavement centerline. Texture at a time and in a manner that produces the coarsest texture for the method used.

For LCB to be paved with HMA, the finished surface must not vary more than 0.05 foot from the grade established by the Engineer.

Do not texture LCB that will be covered with concrete pavement. Before applying curing compound, finish LCB to a smooth surface free from mortar ridges and other projections.

For LCB to be paved with concrete pavement, the finished surface must not be above the grade, or more than 0.05 foot below the grade established by the Engineer.

The finished surface must be free from porous areas.

### **28-2.03F Curing**

After finishing LCB, cure LCB with pigmented curing compound under section 90-1.03B(3) and 40-1.03K except for LCB to be paved with concrete pavement, comply with section 36-2. Apply curing compound to the area to be paved with concrete pavement:

1. In 2 separate applications
2. Before the atmospheric temperature falls below 40 degrees F





## **37 BITUMINOUS SEALS**

07-19-13

Replace section 37-1.01 with:

01-18-13

### **37-1.01 GENERAL**

#### **37-1.01A Summary**

Section 37-1 includes general specifications for applying bituminous seals.

#### **37-1.01B Definitions**

Reserved

#### **37-1.01C Submittals**

Reserved

#### **37-1.01D Quality Control and Assurance**

##### **37-1.01D(1) General**

Reserved

##### **37-1.01D(2) Prepaving Conference**

For seal coats and micro-surfacing, schedule a prepaving conference at a mutually agreed upon time and place to meet with the Engineer.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. Paving construction foreman
3. Traffic control foreman

Be prepared to discuss:

1. Quality control
2. Acceptance testing
3. Placement
4. Training on placement methods
5. Checklist of items for proper placement
6. Unique issues specific to the project, including:
  - 6.1. Weather
  - 6.2. Alignment and geometrics
  - 6.3. Traffic control issues
  - 6.4. Haul distances
  - 6.5. Presence and absence of shaded areas
  - 6.6. Any other local issues

### **37-1.02 MATERIALS**

Not Used

### **37-1.03 CONSTRUCTION**

Not Used

### **37-1.04 PAYMENT**

Not Used

**Replace section 37-2 with:**

07-19-13

**37-2 SEAL COATS**

**37-2.01 GENERAL**

**37-2.01A General**

**37-2.01A(1) Summary**

Section 37-2 includes specifications for applying seal coats.

**37-2.01A(2) Definitions**

Reserved

**37-2.01A(3) Submittals**

Reserved

**37-2.01A(4) Quality Control and Assurance**

The following personnel must attend the prepaving conference:

1. Aggregate suppliers
2. Chip spreader operators
3. Emulsion and binder distributor
4. Coated chips producer if coated chips are used

**37-2.01B Materials**

Screenings must be broken stone, crushed gravel, or both. At least 90 percent of screenings by weight must be crushed particles as determined under California Test 205.

Screenings for seal coats must have the properties specified in the following table:

<b>Seal Coat Screenings</b>		
Properties	Test method	Specification
Los Angeles Rattler, %, max	California Test	
Loss at 100 revolutions.	211	10
Loss at 500 revolutions.		40
Film stripping, %, max	California Test	25
	302	

**37-2.01C Construction**

**37-2.01C(1) General**

Wherever final sweeping or brooming of the seal coat surface is complete, place permanent traffic stripes and pavement markings within 10 days.

If you fail to place the permanent traffic stripes and pavement markings within the specified time, the Department withholds 50 percent of the estimated value of the seal coat work completed that has not received permanent traffic stripes and pavement markings.

**37-2.01C(2) Equipment**

Equipment for seal coats must include and comply with the following:

1. Screenings haul trucks. Haul trucks must have:
  - 1.1. Tailgates that discharge screenings
  - 1.2. Devices to lock onto the rear screenings spreader hitch
  - 1.3. Dump beds that will not push down on the spreader when fully raised
  - 1.4. Dump beds that will not spill screenings on the roadway when transferred to the spreader hopper
  - 1.5. Tarpaulins to cover precoated screenings when haul distance exceeds 30 minutes or ambient temperature is less than 65 degrees F
2. Self-propelled screenings spreader. The spreader must have:
  - 2.1. Screenings hopper in the rear

- 2.2. Belt conveyors that carry the screenings to the front
- 2.3. Spreading hopper capable of providing a uniform screening spread rate over the entire width of the traffic lane in 1 application.
3. Self-propelled power brooms. Do not use gutter brooms or steel-tined brooms. Brooms must be capable of removing loose screenings adjacent to barriers that prevent screenings from being swept off the roadway, including curbs, gutters, dikes, berms, and railings.
4. Pneumatic-tired rollers. Pneumatic-tired rollers must be an oscillating type at least 4 feet wide. Each roller must be self-propelled and reversible. Pneumatic tires must be of equal size, diameter, type, and ply. The roller must carry at least 3,000 lb of load on each wheel and each tire must have an air pressure of  $100 \pm 5$  psi.

### **37-2.01C(3) Surface Preparation**

Before applying seal coat, cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with a sufficient number of control points to relocate the facilities after the application of the seal coat.

After completion of the seal coat operation, remove covers from the facilities.

Immediately before applying seal coat, clean the surface to receive seal coat by removing extraneous material and drying. Cleaning the existing pavement includes the use of brooms.

### **37-2.01C(4) Applying Emulsion and Asphalt Binder**

Prevent spray on existing pavement not intended for seal coat or on previously applied seal coat using a material such as building paper. Remove the material after use.

Align longitudinal joints between seal coat applications with designated traffic lanes.

For emulsion, overlap longitudinal joints by not more than 4 inches. You may overlap longitudinal joints up to 8 inches if authorized.

For areas not accessible to a truck distributor bar, apply the emulsion with a squeegee or other authorized means. For asphalt binder, hand spray nonaccessible areas. You may overlap the emulsion or asphalt binder applications before the application of screenings at longitudinal joints.

Do not apply the emulsion or asphalt binder unless there are sufficient screenings at the job site to cover the emulsion or asphalt binder.

Discontinue application of emulsion or asphalt binder early enough to comply with lane closure specifications and darkness. Apply to 1 lane at a time and cover the lane entirely in 1 operation.

### **37-2.01C(5) Spreading Screenings**

Prevent vehicles from driving on asphaltic emulsion or asphalt binder before spreading screenings.

Spread screenings at a uniform rate over the full lane width in 1 application.

Broom excess screenings at joints before spreading adjacent screenings.

Operate the spreader at speeds slow enough to prevent screenings from rolling over after dropping.

If the spreader is not moving, screenings must not drop. If you stop spreading and screenings drop, remove the excess screenings before resuming activities.

### **37-2.01C(6) Finishing**

Remove piles, ridges, or unevenly distributed screenings. Repair permanent ridges, bumps, or depressions in the finished surface. Spread additional screenings and roll if screenings are picked up by rollers or vehicles.

Seal coat joints between adjacent applications of seal coat must be smooth, straight, uniform, and completely covered. Longitudinal joints must be at lane lines and not overlap by more than 4 inches. Blend the adjacent applications by brooming.

A coverage is the number of passes a roller needs to cover the width. A pass is 1 roller movement parallel to the seal coat application in either direction. Overlapping passes are part of the coverage being made and are not part of a subsequent coverage. Do not start a coverage until completing the previous coverage.

Before opening to traffic, finish seal coat in the following sequence:

1. Perform initial rolling consisting of 1 coverage with a pneumatic-tired roller
2. Perform final rolling consisting of 3 coverages with a pneumatic-tired roller
3. Broom excess screenings from the roadway and adjacent abutting areas
4. Apply flush coat if specified

The Engineer may order salvaging of excess screenings.

Dispose of excess screenings the Engineer determines are not salvageable. Dispose of screenings in any of the following ways or locations:

1. Under section 14-10
2. On embankment slopes
3. In authorized areas

Salvaging and stockpiling excess screenings is change order work.

### **37-2.01C(7) Seal Coat Maintenance**

Seals coat surfaces must be maintained for 4 consecutive days from the day screenings are applied. Maintenance must include brooming to maintain a surface free of loose screenings, to distribute screenings over the surface so as to absorb any free asphaltic material, to cover any areas deficient in cover coat material, and to prevent formation of corrugations.

After 4 consecutive days, excess screenings must be removed from the paved areas. Brooming must not displace screenings set in asphaltic material.

The exact time of brooming will be determined by the Engineer. As a minimum, brooming will be required at the following times:

1. On 2-lane 2-way roadways, from 2 to 4 hours after traffic, controlled with pilot cars, has been routed on the seal coat
2. On multilane roadways, from 2 to 4 hours after screenings have been placed
3. In addition to previous brooming, immediately before opening any lane to public traffic, not controlled with pilot cars
4. On the morning following the application of screenings on any lane that has been open to public traffic not controlled with pilot cars and before starting any other activities

For 2-lane 2-way roadways under 1-way traffic control, upon completion of secondary rolling, public traffic must be controlled with pilot cars and routed over the new seal coat for a period of 2 to 4 hours. The Engineer will determine the exact period of time.

Schedule the operations so that seal coat is placed on both lanes of the traveled way each work shift and so that 1-way traffic control is discontinued 1 hour before darkness. At the end of the work shift, the end of the seal coat on both lanes must generally match.

On multilane roadways, initial brooming must begin after the screenings have been in place for a period of 2 to 4 hours. If the initial brooming is not completed during the work shift in which the screenings were placed, the initial brooming must be completed at the beginning of the next work shift.

Public traffic must be controlled with pilot cars and be routed on the new seal coat surface of the lane for a minimum of 2 hours after completion of the initial brooming and before opening the lane to traffic not controlled with pilot cars. When traffic is controlled with pilot cars, a maximum of 1 lane in the direction of travel must be open to public traffic. Once traffic controlled with pilot cars is routed over the seal coat at a particular location, continuous control must be maintained at that location until the seal coat placement and brooming on adjacent lanes to receive seal coat is completed.

### **37-2.01D Payment**

If there is no bid item for a traffic control system, furnishing and using a pilot car is included in the various items of the work involved in applying the seal coat.

If test results for the screenings grading do not comply with specifications, you may remove the seal coat represented by these tests or request that it remain in place with a payment deduction. The deduction is \$1.75 per ton for the screenings represented by the test results.

### **37-2.02 FOG SEAL**

#### **37-2.02A General**

##### **37-2.02A(1) Summary**

Fog seal coat includes applying a slow-setting asphaltic emulsion.

##### **37-2.02A(2) Definitions**

Reserved

##### **37-2.02A(3) Submittals**

Submit a 1/2-gallon sample of the asphaltic emulsion in a plastic container. Take the sample from the distributor truck spray bar at mid-load.

##### **37-2.02A(4) Quality Control and Assurance**

Reserved

#### **37-2.02B Material**

The Engineer selects the grade of slow-setting asphaltic emulsion to be used.

If additional water is added to the asphaltic emulsion, the resultant mixture must not be more than 1 part asphaltic emulsion to 1 part water. The Engineer determines the exact amount of additional water.

#### **37-2.02C Construction**

Apply asphaltic emulsion for fog seal coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

Apply fog seal coat when the ambient air temperature is above 40 degrees F.

Sprinkle water on fog seal coat that becomes tacky in an amount determined by the Engineer.

If fog seal coat and seal coat with screenings are specified on the same project, apply fog seal coat at least 4 days before applying the adjoining seal coat with screenings. The joint between the seal coats must be neat and uniform.

#### **37-2.02D Payment**

The Department does not adjust the unit price for an increase or decrease in the asphaltic emulsion (fog seal coat) quantity.

### **37-2.03 FLUSH COATS**

#### **37-2.03A General**

Flush coat includes applying a fog seal coat to the surface of a seal coat, followed by sand.

#### **37-2.03B Material**

The Engineer selects the grade of slow-setting or quick-setting asphaltic emulsion to be used.

Sand for flush coat must comply with the material specifications for fine aggregate grading in section 90-1.02C(3). Sand must not include organic material or clay.

#### **37-2.03C Construction**

Apply asphaltic emulsion for flush coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

During flush coat activities, close adjacent lanes to traffic. Do not track asphaltic emulsion on existing pavement surfaces.

Apply sand immediately after the asphaltic emulsion application.

Spread sand with a self-propelled screenings spreader equipped with a mechanical device that spreads sand at a uniform rate over the full width of a traffic lane in a single application. Spread sand at a rate from 2 to 6 lb/sq yd. The Engineer determines the exact rate.

### **37-2.03D Payment**

The Department does not adjust the unit price for an increase or decrease in the sand cover for the flush coat quantity.

## **37-2.04 ASPHALTIC EMULSION SEAL COAT**

### **37-2.04A General**

#### **37-2.04A(1) General**

##### **37-2.04A(1)(a) Summary**

Section 37-2.04 includes specifications for applying asphaltic emulsion seal coat. Asphaltic emulsion seal coat includes applying asphaltic emulsion, followed by screenings, and then a flush coat.

Asphaltic emulsion seal coat includes one or more of the following types:

1. Nonpolymer asphaltic emulsion seal coat
2. Polymer asphaltic emulsion seal coat

A double asphaltic emulsion seal coat is the application of asphaltic emulsion, followed by screenings applied twice in sequence.

##### **37-2.04A(1)(b) Definitions**

Reserved

##### **37-2.04A(1)(c) Submittals**

Submit a 1/2-gallon sample of asphaltic emulsion in a plastic container. Take the sample from the distributor truck spray bar at mid load.

At least 10 days before starting asphaltic emulsion seal coat application, submit the name of an authorized laboratory that will be performing asphaltic emulsion QC testing.

Submit a sample of asphaltic emulsion to the authorized laboratory and the Engineer. Each sample must be submitted in an insulated shipping container within 24 hours of sampling.

Within 7 days after taking samples, submit the authorized laboratory's test results for asphaltic emulsion.

##### **37-2.04A(1)(d) Quality Control and Assurance**

Samples for the screenings grading and cleanness value must be taken from the spreader conveyor belt.

Within 3 business days of sampling, the authorized laboratory must test asphaltic emulsion for:

1. Viscosity under AASHTO T 59
2. Sieve test under AASHTO T 59
3. Demulsibility under AASHTO T 59
4. Torsional recovery under California Test 332 for polymer asphaltic emulsion

Circulate polymer asphaltic emulsion in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. Take two 1/2-gallon samples in the presence of the Engineer.

If test results for asphaltic emulsion are not in compliance with the specifications, you may request that the asphaltic emulsion seal coat represented by the tests remain in place with a payment deduction based on the pay factors.

### **37-2.04A(2) Materials**

Not Used

**37-2.04A(3) Construction**

The Engineer determines the exact application rate.

At the time of application, the temperature of the asphaltic emulsion must be from 130 to 180 degrees F.

When tested under California Test 339, the application rate for asphaltic emulsion must not vary from the average by more than:

1. 15 percent in the transverse direction
2. 10 percent in the longitudinal direction

**37-2.04A(4) Payment**

Not Used

**37-2.04B Nonpolymer Asphaltic Emulsion Seal Coat****37-2.04B(1) General****37-2.04B(1)(a) Summary**

Section 37-2.04B includes specifications for applying a nonpolymer asphaltic emulsion seal coat.

**37-2.04B(1)(b) Definitions**

Reserved

**37-2.04B(1)(c) Submittals**

Reserved

**37-2.04B(1)(d) Quality Control and Assurance**

For nonpolymer asphaltic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 80, you may request that the asphaltic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphaltic emulsion seal coat.

**37-2.04B(2) Materials**

Screenings for nonpolymer asphaltic emulsion seal coat must have the gradation as determined under California Test 202 in the following table.

**Nonpolymer Asphaltic Emulsion Seal Coat Screenings  
Gradation**

Sieve sizes	Percentage passing			
	Coarse 1/2" max	Medium 3/8" max	Medium fine 5/16" max	Fine 1/4" max
3/4"	100	--	--	--
1/2"	95-100	100	--	--
3/8"	50-80	90-100	100	100
No. 4	0-15	5-30	30-60	60-85
No. 8	0-5	0-10	0-15	0-25
No. 16	--	0-5	0-5	0-5
No. 30	--	--	0-3	0-3
No. 200	0-2	0-2	0-2	0-2

The cleanness value determined under California Test 227 must be 80.

**37-2.04B(3) Construction**

Asphaltic emulsion must be applied within the application rate ranges shown in the following table:

**Asphaltic Emulsion Application Rates**

Screenings	Application rate range(gallons per square yard)
Fine	0.15–0.30
Medium fine	0.25–0.35
Medium	0.25–0.40
Coarse	0.30–0.40

Apply asphaltic emulsion when the ambient air temperature is from 65 to 110 degrees F and the pavement surface temperature is at least 80 degrees F.

Do not apply asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

For double asphaltic emulsion seal coat, the asphaltic emulsion must be applied within the application rates shown in the following table:

**Asphaltic Emulsion Application Rates**

Screenings	Application rate range (gal/sq yd)
Double	
1st application	0.20–0.35
2nd application	0.20–0.30

You may stockpile screenings for asphaltic emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the asphaltic emulsion sets or breaks.

Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

**Screening Spread Rates**

Seal coat type	Range (lb/sq yd)
Fine	12–20
Medium fine	16–25
Medium	20–30
Coarse	23–30

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double asphaltic emulsion seal coat, screenings must have a spread rate within the ranges shown in the following table:

**Screening Spread Rates**

Seal coat type	Range (lb/sq yd)
Double	
1st application	23–30
2nd application	12–20

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

**37-2.04B(4) Payment**

If asphaltic emulsion seal coat with screenings does not comply with the cleanness value specifications, you may request that the seal coat remain in place with a pay deduction corresponding to the cleanness value shown in the following table:

**Asphaltic Emulsion Seal Coat Cleanness Value Deductions**

Cleanness value	Deduction
80 or over	None
79	\$2.00 /ton
77-78	\$4.00 /ton
75-76	\$6.00 /ton

**37-2.04C Polymer Asphaltic Emulsion Seal Coat**

**37-2.04C(1) General**

**37-2.04C(1)(a) Summary**

Section 37-2.04C includes specifications for applying a polymer asphaltic emulsion seal coat.

**37-2.04C(1)(b) Definitions**

Reserved

**37-2.04C(1)(c) Submittals**

At least 10 days before starting polymer asphaltic emulsion seal coat application, submit a signed copy of the test result report of the Vialit test method for aggregate retention in chip seals (french chip) to the Engineer and to:

DEPARTMENT OF TRANSPORTATION  
Division of Maintenance, Roadway Maintenance Office  
1120 N Street, MS 31  
Sacramento, CA 95814

**37-2.04C(1)(d) Quality Control and Assurance**

The authorized laboratory must test screenings for retention under the Vialit test method for aggregate in chip seals (french chip). The Vialit test results are not used for acceptance. The Vialit test is available at the METS Web site.

If the test results for polymer asphaltic emulsion do not comply with the specifications, the Engineer assesses a pay factor value for the following properties and increments:

**Polymer Asphaltic Emulsion Pay Factor Table**

Test method and property	Increment	Pay factor
<b>Test on polymer asphaltic emulsion</b>		
AASHTO T 59 (Viscosity, sec Saybolt Furol, at 50 °C)	Each 10 seconds above max or below min	1
AASHTO T 59 (settlement, 5 days, percent)	Each 1.5 percent above max	1
AASHTO T 59 (sieve test, percent max)	Each 0.2 percent above max	1
AASHTO T 59 (demulsibility percent)	Each 2 percent below min	1
<b>Test on residue from evaporation test</b>		
AASHTO T 49 (penetration, 25 °C)	Each 2 dm above max or below min	1
ASTM D 36 (field softening point °C)	2 °C below min	1
California Test 332 (torsional recovery <sup>a</sup> )	For each 1 increment below the min value of 18	1
	For each 2 increments below the min value of 18	3
	For each 3 or more increments below the min value of 18	10

<sup>a</sup> The highest pay factor applies

The Engineer assesses a pay factor of 1 for sampling not performed in compliance with the specifications, including shipping and sampling containers.

For polymer asphaltic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 86, you may request that the asphaltic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphaltic emulsion seal coat.

**37-2.04C(2) Materials**

Polymer asphaltic emulsion must include elastomeric polymer.

Polymer asphaltic emulsion must comply with section 94, Table 3, under the test on residue from evaporation test for Grades PMRS2, PMRS2h, PMCRS2, and PMCRS2h and the following:

1. The penetration at 39.2 degrees F (200g for 60 seconds) determined under AASHTO T 49 must be at least 6.
2. Test elastic recovery under AASHTO T 301.
3. Polymer content in percent by weight does not apply.
4. The minimum ring and ball softening point temperature determined under AASHTO T 53 for Test on Residue from Evaporation Test must comply with the following:
  - 4.1. 126 degrees F for a geographical ambient temperature from 32 to 104 degrees F
  - 4.2. 129 degrees F for a geographical ambient temperature from 18 to 104 degrees F
  - 4.3. 135 degrees F for a geographical ambient temperature from 18 to greater than 104 degrees F

Screenings for polymer asphaltic emulsion seal coat must have the gradation as determined under California Test 202 in the following table:

**Polymer Asphaltic Emulsion Seal Coat Screenings Gradation**

Sieve sizes	Percentage passing			
	Coarse 1/2" max	Medium 3/8" max	Medium fine 5/16" max	Fine 1/4" max
3/4"	100	--	--	--
1/2"	85-100	100	--	--
3/8"	0-30	85-100	100	100
No. 4	0-5	0-15	0-50	60-85
No. 8	--	0-5	0-15	0-25
No. 16	--	--	0-5	0-5
No. 30	--	--	0-3	0-3
No. 200	0-2	0-2	0-2	0-2

The cleanness value determined under California Test 227 must be 86.

**37-2.04C(3) Construction**

Polymer asphaltic emulsion must be applied within the application rate ranges shown in the following table:

**Polymer Asphaltic Emulsion Application Rates**

Screenings	Application rate range(gallons per square yard)
Fine	0.15-0.30
Medium fine	0.25-0.35
Medium	0.25-0.40
Coarse	0.30-0.40

The Engineer determines the exact application rate.

At the time of application, the temperature of polymer asphaltic emulsion must be from 130 to 180 degrees F.

Apply polymer asphaltic emulsion when the ambient air temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply polymer asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

When tested under California Test 339, the application rate for polymer asphaltic emulsion must not vary from the average by more than:

1. 15 percent in the transverse direction
2. 10 percent in the longitudinal direction

For double asphaltic emulsion seal coat, polymer asphaltic emulsion must be applied within the application rates shown in the following table:

**Polymer Asphaltic Emulsion Application Rates**

Screenings	Application rate range (gal/sq yd)
Double	
1st application	0.20-0.35
2nd application	0.20-0.30

You may stockpile screenings for polymer emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the polymer emulsion sets or breaks.

Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

**Screening Spread Rates**

Seal coat type	Range (lb/sq yd)
Fine	12–20
Medium fine	16–25
Medium	20–30
Coarse	23–30

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double seal coat, screenings must have a spread rate within the ranges shown in the following table:

**Screening Spread Rates**

Seal coat type	Range (lb/sq yd)
Double	
1st application	23–30
2nd application	12–20

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

**37-2.04C(4) Payment**

If polymer asphaltic emulsion seal coat with screenings does not comply with the specifications for cleanness value you may request that the seal coat remain in place with a pay deduction corresponding by the cleanness value shown in the following table:

**Polymer Asphaltic Emulsion Seal Coat Cleanness Value Deductions**

Cleanness value	Deduction
86 or over	None
81–85	\$2.20/ton
77–80	\$4.40/ton
75–76	\$6.60/ton

If test results for polymer asphaltic emulsion aggregate grading and cleanness value test results do not comply with the specifications, all deductions are made. A test for polymer asphaltic emulsion represents the smaller of 55 tons or 1 day's production. A test for the screenings grading or cleanness value represents the smaller of 300 tons or 1 day's production.

The payment deduction for noncompliant polymer asphaltic emulsion is based on the total pay factor value determined from the table titled, "Polymer Asphaltic Emulsion Pay Factor Deduction." You must remove polymer asphaltic emulsion seal coat with a pay factor value greater than 20. You may request seal coat with noncompliant polymer asphaltic emulsion to remain in place with a pay deduction for the total pay factor value shown in the following table:

**Polymer Asphaltic Emulsion Pay Factor Deductions**

Total pay factor value	Deduction
0	none
1–2	\$5.00/ton
3–5	\$10.00/ton
6–9	\$15.00/ton
10–14	\$25.00/ton
15–20	\$50.00/ton

## **37-2.05 ASPHALT BINDER SEAL COATS**

### **37-2.05A General**

Reserved

### **37-2.05B Asphalt Rubber Binder Seal Coats**

#### **37-2.05B(1) General**

##### **37-2.05B(1)(a) Summary**

Section 37-2.05B includes specifications for applying asphalt rubber binder seal coat. Asphalt rubber seal coat includes applying heated asphalt rubber binder, followed by heated screenings precoated with asphalt binder, followed by a flush coat.

##### **37-2.05B(1)(b) Definitions**

**crumb rubber modifier:** Ground or granulated high natural crumb rubber or scrap tire crumb rubber.

**descending viscosity reading:** Subsequent viscosity reading at least 5 percent lower than the previous viscosity reading.

**high natural crumb rubber:** Material containing 40 to 48 percent natural rubber.

**scrap tire crumb rubber:** Any combination of:

1. Automobile tires
2. Truck tires
3. Tire buffing

##### **37-2.05B(1)(c) Submittals**

For each delivery of asphalt rubber binder ingredients and asphalt rubber binder to the job site, submit a certificate of compliance and a copy of the specified test results.

Submit MSDS for each asphalt rubber binder ingredient and the asphalt rubber binder.

At least 15 days before use, submit:

1. Four 1-quart cans of mixed asphalt rubber binder
2. Samples of each asphalt rubber binder ingredient
3. Asphalt rubber binder formulation and data as follows:
  - 3.1. For asphalt binder and asphalt modifier submit:
    - 3.1.1. Source and grade of asphalt binder
    - 3.1.2. Source and type of asphalt modifier
    - 3.1.3. Percentage of asphalt modifier by weight of asphalt binder
    - 3.1.4. Percentage of combined asphalt binder and asphalt modifier by weight of asphalt rubber binder
    - 3.1.5. Test results for the specified quality characteristics
  - 3.2. For crumb rubber modifier submit:
    - 3.2.1. Each source and type of scrap tire crumb rubber and high natural rubber
    - 3.2.2. Percentage of scrap tire crumb rubber and high natural rubber by total weight of asphalt rubber binder
    - 3.2.3. Test results for the specified quality characteristics
  - 3.3. For asphalt rubber binder submit:
    - 3.3.1. Test results for the specified quality characteristics
    - 3.3.2. Minimum reaction time and temperature

At least 5 business days before use, submit the permit issued by the local air quality agency for asphalt rubber binder:

1. Field blending equipment
2. Application equipment

If an air quality permit is not required by the local air quality agency for producing asphalt rubber binder or spray applying asphalt rubber binder, submit verification from the local air quality agency that an air quality permit is not required for this Contract.

Submit a certified volume or weight slip for each delivery of asphalt rubber binder ingredients and asphalt rubber binder.

Submit a certificate of compliance and accuracy verification of test results for viscometers.

When determined by the Engineer, submit notification 15 minutes before each viscosity test or submit a schedule of testing times.

Submit the log of asphalt rubber binder viscosity test results each day of asphalt rubber seal coat work.

#### **37-2.05B(1)(d) Quality Control and Assurance**

Equipment used in producing asphalt rubber binder must be permitted for use by the local air quality agency. Equipment used in spreading asphalt rubber binder must be permitted for use by the local air quality agency.

Each asphalt rubber binder ingredient must be sampled and tested for compliance with the specifications by the manufacturer.

Test and submit results at least once per project or the following, whichever frequency is greater:

1. For crumb rubber modifier except for grading, at least once per 250 tons. Samples of scrap tire crumb rubber and high natural crumb rubber must be sampled and tested separately. Test each delivery of crumb rubber modifier for grading.
2. For asphalt binder, test and submit at least once per 200 tons of asphalt binder production.
3. For asphalt modifier, test and submit at least once per 25 tons of asphalt modifier production.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber production site in separate bags.

Take viscosity readings of asphalt rubber binder under ASTM D7741 during asphalt rubber binder production. Start taking viscosity readings of samples taken from the reaction vessel at least 45 minutes after adding crumb rubber modifier and continue taking viscosity readings every 30 minutes until 2 consecutive descending viscosity readings have been obtained and the final viscosity meets the specification requirement. After meeting the 2 descending viscosity readings requirement, continue to take viscosity readings hourly and within 15 minutes before use. Log the test results, including time of testing and temperature of the asphalt rubber binder.

#### **37-2.05B(2) Material**

##### **37-2.05B(2)(a) General**

Reserved

##### **37-2.05B(2)(b) Asphalt Binder**

Asphalt binder must comply with the specifications for asphalt binder. Do not modify asphalt binder with polymer.

##### **37-2.05B(2)(c) Asphalt Modifier**

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon. Asphalt modifier must have the values for the quality characteristics shown in the following table:

**Asphalt Modifier for Asphalt Rubber Binder**

Quality characteristic	Test method	Value
Viscosity, m <sup>2</sup> /s (x 10 <sup>-6</sup> ) at 100 °C	ASTM D 445	X ± 3 <sup>a</sup>
Flash point, CL.O.C., °C	ASTM D 92	207 min
Molecular analysis		
Asphaltenes, percent by mass	ASTM D 2007	0.1 max
Aromatics, percent by mass	ASTM D 2007	55 min

<sup>a</sup> "X" denotes the proposed asphalt modifier viscosity from 19 to 36. A change in "X" requires a new asphalt rubber binder submittal.

**37-2.05B(2)(d) Crumb Rubber Modifier**

Crumb rubber modifier must be ground or granulated at ambient temperature.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber binder production site in separate bags.

Steel and fiber must be separated. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Cryogenically-produced crumb rubber modifier particles must be large enough to be ground or granulated.

Wire must not be more than 0.01 percent by weight of crumb rubber modifier. Crumb rubber modifier must be free of contaminants except fabric, which must not exceed 0.05 percent by weight of crumb rubber modifier. Method for determining the percent weight of wire and fabric is available under Laboratory Procedure 10 at the following METS Web site:

<http://www.dot.ca.gov/hq/esc/Translab/ofpm/fpmlab.htm>

The length of an individual crumb rubber modifier particle must not exceed 3/16 inch.

Crumb rubber modifier must be dry, free-flowing particles that do not stick together. A maximum of 3 percent calcium carbonate or talc by weight of crumb rubber modifier may be added. Crumb rubber modifier must not cause foaming when combined with the asphalt binder and asphalt modifier.

Specific gravity of crumb rubber modifier must be from 1.1 to 1.2 determined under California Test 208.

When tested under ASTM D 297, crumb rubber modifier must comply with the requirements shown in the following table:

**Crumb Rubber Modifier**

Quality characteristic	Scrap tire crumb rubber (percent)		High natural rubber (percent)	
	Min	Max	Min	Max
Acetone extract	6.0	16.0	4.0	16.0
Rubber hydrocarbon	42.0	65.0	50.0	--
Natural rubber content	22.0	39.0	40.0	48.0
Carbon black content	28.0	38.0	--	--
Ash content	--	8.0	--	--

Scrap tire crumb rubber must have the gradation shown in the following table:

**Scrap Tire Crumb Rubber Gradation**  
Percentage passing

Sieve size	Gradation limit	Operating range	Contract compliance
No. 8	100	100	100
No. 10	98–100	95–100	90–100
No. 16	45–75	35–85	32–88
No. 30	2–20	2–25	1–30
No. 50	0–6	0–10	0–15
No. 100	0–2	0–5	0–10
No. 200	0	0–2	0–5

High natural crumb rubber must have the gradation shown in the following table:

**High Natural Crumb Rubber Gradation**  
Percentage passing

Sieve size	Gradation limit	Operating range	Contract compliance
No. 10	100	100	100
No. 16	95–100	92–100	85–100
No. 30	35–85	25–95	20–98
No. 50	10–30	6–35	2–40
No. 100	0–4	0–7	0–10
No. 200	0–1	0–3	0–5

Test the crumb rubber modifier gradation under ASTM C 136 except

- Split or quarter  $100 \pm 5$  g from the crumb rubber modifier sample and dry to a constant mass at a temperature from 57 to 63 degrees C and record the dry sample mass. Place the crumb rubber modifier sample and 5 g of talc in a 1/2-liter jar. Seal the jar, then shake the jar by hand for at least 1 minute to mix the crumb rubber modifier and the talc. Continue shaking or open the jar and stir until the particle agglomerates and clumps are broken and the talc is uniformly mixed.
- Place 1 rubber ball on each sieve. Each ball must weigh  $8.5 \pm 0.5$  g, measure  $24.5 \pm 0.5$  mm in diameter, and have a Shore Durometer "A" hardness of  $50 \pm 5$  determined under ASTM D 2240. After sieving the combined material for  $10 \pm 1$  minutes, disassemble the sieves. Brush material adhering to the bottom of a sieve into the next finer sieve. Weigh and record the mass of the material retained on the 2.36-milimeter sieve and leave this material (do not discard) on the scale or balance. Fabric balls must remain on the scale or balance and be placed together on the side to prevent them from being covered or disturbed when the material from finer sieves is placed onto the scale or balance. The material retained on the 2.00-milimeter sieve must be added to the scale or balance. Weigh and record that mass as the accumulative mass retained on the 2.00-milimeter sieve. Continue weighing and recording the accumulated masses retained on the remaining sieves until the accumulated mass retained in the pan has been determined. Before discarding the crumb rubber modifier sample, separately weigh and record the total mass of fabric balls in the sample.
- Determine the mass of material passing the 75-micrometer sieve by subtracting the accumulated mass retained on the 75-micrometer sieve from the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass of 5 g or less, cross out the recorded number for the accumulated mass retained in the pan and copy the number recorded for the accumulated mass retained on the 75-micrometer sieve and record that number, next to the crossed out number, as the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass greater than 5 g, cross out the recorded number for the accumulated mass retained in the pan, subtract 5 g from that number and record the difference next to the crossed out number. The adjustment to the accumulated mass retained in the pan accounts for the 5 g of talc added to the sample. For calculation purposes, the adjusted total sample mass is the same as the adjusted

accumulated mass retained in the pan. Determine the percent passing based on the adjusted total sample mass and record to the nearest 0.1 percent.

**37-2.05B(2)(e) Asphalt Rubber Binder**

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier

Asphalt rubber binder blending equipment must be authorized under the Department's material plant quality program.

The blending equipment must allow the determination of weight percentages of each asphalt rubber binder ingredient.

Asphalt rubber binder must be  $79 \pm 1$  percent by weight asphalt binder and  $21 \pm 1$  percent by weight of crumb rubber modifier. The minimum percentage of crumb rubber modifier must be 20.0 percent and lower values may not be rounded up.

Crumb rubber modifier must be  $76 \pm 2$  percent by weight scrap tire crumb rubber and  $24 \pm 2$  percent by weight high natural rubber.

Asphalt modifier and asphalt binder must be blended at the production site. Asphalt modifier must be from 2.5 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder. The asphalt rubber binder supplier determines the exact percentage.

If blended, the asphalt binder must be from 375 to 440 degrees F when asphalt modifier is added and the mixture must circulate for at least 20 minutes. Asphalt binder, asphalt modifier, and crumb rubber modifier may be proportioned and combined simultaneously.

The blend of asphalt binder and asphalt modifier must be combined with crumb rubber modifier at the asphalt rubber binder production site. The asphalt binder and asphalt modifier blend must be from 375 to 440 degrees F when crumb rubber modifier is added. Combined ingredients must be allowed to react at least 45 minutes at temperatures from 375 to 425 degrees F except the temperature must be at least 10 degrees F below the flash point of the asphalt rubber binder.

After reacting, the asphalt rubber binder must have the values for the quality characteristics shown in the following table:

Quality characteristic	Test method	Requirement	
		Min	Max
Cone penetration @ 25 °C, 1/10 mm	ASTM D 217	25	60
Resilience @ 25 °C, percent rebound	ASTM D 5329	18	50
Field softening point, °C	ASTM D 36	55	88
Viscosity @190 °C, Pa • s ( $\times 10^{-3}$ )	ASTM D 7741	1500	2500

Maintain asphalt rubber binder at a temperature from 375 to 415 degrees F.

Stop heating unused asphalt rubber binder 4 hours after the 45-minute reaction period. Reheating asphalt rubber binder that cools below 375 degrees F is a reheat cycle. Do not exceed 2 reheat cycles. If reheating, asphalt rubber binder must be from 375 to 415 degrees F before use.

During reheating, you may add scrap tire crumb rubber. Scrap tire crumb rubber must not exceed 10 percent by weight of the asphalt rubber binder. Allow added scrap tire crumb rubber to react for at least 45 minutes. Reheated asphalt rubber binder must comply with the specifications for asphalt rubber binder.

**37-2.05B(2)(f) Screenings**

Before precoating with asphalt binder and when tested under California Test 202, screenings for asphalt rubber seal coat must have the gradation shown in the following table:

**Asphalt Rubber Seal Coat Screenings Gradation**

Sieve sizes	Percentage passing by weight		
	Coarse 1/2" max	Medium 1/2" max	Fine 3/8" max
3/4"	100	100	100
1/2"	75–90	85–90	95–100
3/8"	0–20	0–30	70–85
No. 4	0–2	0–5	0–15
No. 8	--	--	0–5
No. 200	0–1	0–1	0–1

Screenings must have the values for the properties shown in the following table:

**Seal Coat Screenings**

Properties	Test method	Value
Cleanness value, min	California Test 227	80
Durability, min	California Test 229	52

**37-2.05B(3) Construction**

**37-2.05B(3)(a) General**

Reserved

**37-2.05B(3)(b) Equipment**

Self-propelled distributor truck for applying asphalt rubber binder must have the following features:

1. Heating unit
2. Internal mixing unit
3. Pumps that spray asphalt rubber binder within 0.05 gal/sq yd of the specified rate
4. Fully circulating spray bar that applies asphalt rubber binder uniformly
5. Tachometer
6. Pressure gages
7. Volume measuring devices
8. Thermometer
9. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed

**37-2.05B(3)(c) Precoating Screenings**

For asphalt rubber seal coat, do not recombine fine materials collected in dust control systems except cyclone collectors or knock-out boxes with any other aggregate used in the production of screenings.

For asphalt rubber seal coat, screenings must be preheated from 260 to 325 degrees F. Coat with any of the asphalts specified in the table titled "Performance Graded Asphalt Binder" in section 92. Coat at a central mixing plant. The asphalt must be from 0.5 to 1.0 percent by weight of dry screenings. The Engineer determines the exact rate.

Plant must be authorized under the Department's material plant quality program.

Do not stockpile preheated or precoated screenings.

**37-2.05B(3)(d) Asphalt Rubber Binder Application**

Apply asphalt rubber binder immediately after the reaction period. At the time of application, the temperature of asphalt rubber binder must be from 385 to 415 degrees F.

Apply asphalt rubber binder at a rate from 0.55 to 0.65 gal/sq yd. The Engineer determines the exact rate.

Apply asphalt rubber binder when the atmospheric temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply asphalt rubber binder unless there are sufficient screenings available to cover the asphalt rubber binder within 2 minutes. Intersections, turn lanes, gore points, and irregular areas must be covered within 15 minutes.

Do not apply asphalt rubber binder when weather or road conditions are unsuitable, including high wind or when the pavement is damp. In windy conditions you may adjust the distributor bar height and distribution speed, and use shielding equipment, if the Engineer authorizes your request.

#### **37-2.05B(3)(e) Screenings Application**

During transit, cover precoated screenings for asphalt rubber seal coat with tarpaulins if the ambient air temperature is below 65 degrees F or the haul time exceeds 30 minutes.

At the time of application, screenings for asphalt rubber seal coat must be from 225 to 325 degrees F.

Spread screenings at a rate from 28 to 40 lb/sq yd. The exact rate is determined by the Engineer. Spread to within 10 percent of the determined rate.

#### **37-2.05B(3)(f) Rolling and Sweeping**

Perform initial rolling within 90 seconds of spreading screenings. Do not spread screenings more than 200 feet ahead of the initial rolling.

For final rolling, you may request use of a steel-wheeled roller weighing from 8 to 10 tons, static mode only.

Perform a final sweeping before Contract acceptance. The final sweeping must not dislodge screenings.

Dispose of swept screenings at least 150 feet from any waterway.

#### **37-2.05B(4) Payment**

Screenings for asphalt rubber seal coat are measured by coated weight after they are preheated and precoated with asphalt binder. The weight of screenings must be the coated weight.

If recorded batch weights are printed automatically, the bid item for screenings for asphalt-rubber seal coat are measured using the printed batch weights, provided:

1. Total aggregate weight for screenings per batch is printed
2. Total asphalt binder weight per batch is printed
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch
4. Time, date, mix number, load number and truck identification are correlated with a load slip
5. A copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer

Screenings for asphalt rubber seal coat is paid for as precoated screenings.

Asphalt-rubber binder is measured under the specifications for asphalts.

If test results for gradation tests do not comply with the specifications, deductions are taken.

Each gradation test for scrap tire crumb rubber represents 10,000 lbs or the amount used in that day's production, whichever is less.

Each gradation test for high natural rubber represents 3,400 lbs or the amount used in that day's production, whichever is less.

For each gradation test, the following pay deductions will be taken from the asphalt rubber bid item:



RAP at a substitution rate not exceeding 25 percent of the aggregate blend. Do not use RAP in OGFC and RHMA-G.

Assign the substitution rate of RAP aggregate for virgin aggregate with the JMF submittal. The JMF must include the percent of RAP used.

Provide enough space for meeting RAP handling requirements at your facility. Provide a clean, graded, well-drained area for stockpiles. Prevent material contamination and segregation.

If RAP is from multiple sources, blend the RAP thoroughly and completely. RAP stockpiles must be homogeneous.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

AASHTO T 324 (Modified) is AASHTO T 324, "Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)," with the following parameters:

07-19-13

1. Target air voids must equal  $7 \pm 1$  percent
2. Specimen height must be  $60 \text{ mm} \pm 1 \text{ mm}$
3. Number of test specimens must be 4
4. Test specimen must be a 150mm gyratory compacted specimen
5. Test temperature must be set at:
  - 5.1.  $122 \pm 2$  degrees F for PG 58
  - 5.2.  $131 \pm 2$  degrees F for PG 64
  - 5.3.  $140 \pm 2$  degrees F for PG 70 and above
6. Measurements for impression must be taken at every 100 passes
7. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
8. Testing shut off must be set at 25,000 passes

02-22-13

**39-1.02F(2) Substitution Rate of 15 Percent or Less**

For a RAP substitution rate of 15 percent or less, you may stockpile RAP during the entire project.

**39-1.02F(3) Substitution Rate Greater than 15 Percent**

07-19-13

For a RAP substitution rate greater than 15 percent, fractionate RAP into 2 sizes, a coarse fraction RAP retained on 3/8-inch screen and a fine fraction RAP passing 3/8-inch screen.

Sample and test processed RAP at a minimum frequency of 1 sample per 1000 tons with a minimum of 6 samples for each processed RAP stockpile. If a processed RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

When tested under California Test 202 with a total mechanical shaking time of 10 minutes  $\pm 15$  seconds, the processed RAP must meet the grading requirements shown in the following table:

**Processed RAP Gradation  
(Percentage Passing)**

Sieve sizes	TV limits	Allowable tolerance
1/2"	100	--
3/8"	97	TV + 3

02-22-13

The processed RAP asphalt binder content must be within  $\pm 2.0$  percent of the average processed RAP stockpile asphalt binder content when tested under ASTM D 2172, Method B. If a new processed RAP stockpile is required, the average binder content of the new processed RAP stockpile must be within  $\pm 2.0$  percent of the average binder content of the original processed RAP stockpile.

The maximum specific gravity for processed RAP must be within  $\pm 0.06$  when tested under California Test 309 of the average maximum specific gravity reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form.

**Replace items 7 and 8 in the 5th paragraph of section 39-1.03A with:**

02-22-13

7. Substitution rate by more than 5 percent if your assigned RAP substitution rate is 15 percent or less
8. Substitution rate by more than 3 percent if your assigned RAP substitution rate is greater than 15 percent
9. Average binder content by more than 2 percent from the average binder content of the original processed RAP stockpile used in the mix design
10. Maximum specific gravity of processed RAP by more than  $\pm 0.060$  from the average maximum specific gravity of processed RAP reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form
11. Any material in the JMF

**Replace the 1st paragraph of section 39-1.03B with:**

02-22-13

Perform a mix design that produces HMA with the values for the quality characteristics shown in the following table:

**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.) No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	17.0	17.0	--
		15.0	15.0	--
		14.0	14.0	18.0–23.0
		13.0	13.0	18.0–23.0
Voids filled with asphalt (%) No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	65.0–75.0	65.0–75.0	Note a
		65.0–75.0	65.0–75.0	
		65.0–75.0	65.0–75.0	
		65.0–75.0	65.0–75.0	
Dust proportion No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.6–1.2	0.6–1.2	Note a
		0.6–1.2	0.6–1.2	
Stabilometer value (min.) No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30	30	--
		37	35	23

<sup>a</sup> Report this value in the JMF submittal.

For RAP substitution rate greater than 15 percent, the mix design must comply with the additional quality characteristics shown in the following table:

**Additional HMA Mix Design Requirements  
for RAP Substitution Rate Greater Than 15 Percent**

Quality characteristic	Test method	HMA type		
		A	B	RHMA-G
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth)	AASHTO T 324 (Modified) <sup>a</sup>			
PG-58		10,000	10,000	--
PG-64		15,000	15,000	
PG-70		20,000	20,000	
PG-76 or higher		25,000	25,000	
Hamburg wheel track (inflection point minimum number of passes)	AASHTO T 324 (Modified) <sup>a</sup>			
PG-58		10,000	10,000	--
PG-64		10,000	10,000	
PG-70		12,500	12,500	
PG-76 or higher		15000	15000	
Moisture susceptibility (minimum dry strength, psi)	California Test 371 <sup>a</sup>	120	120	--
Moisture susceptibility (tensile strength ration, %)	California Test 371 <sup>a</sup>	70	70	--

<sup>a</sup>Test plant produced HMA.

For HMA with RAP, the maximum binder replacement must be 25.0 percent of OBC for surface course and 40.0 percent of OBC for lower courses.

For HMA with a binder replacement less than or equal to 25 percent of OBC, you may request that the PG asphalt binder grade with upper and lower temperature classifications be reduced by 6 degrees C from the specified grade.

For HMA with a binder replacement greater than 25 percent but less than or equal to 40 percent of OBC, you must use a PG asphalt binder grade with upper and lower temperature classifications reduced by 6 degrees C from the specified grade.

**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

**Add to the end of section 39-1.03C:**

For RAP substitution rate greater than 15 percent, submit with the JMF submittal:

02-22-13

- California Test 371 tensile strength ratio and minimum dry strength test results
- AASHTO T 324 (Modified) test results

For RAP substitution rate greater than 15 percent, submit California Test 371 and AASHTO T 324 (Modified) test results to the Engineer and to:

Moisture\_Tests@dot.ca.gov

**Replace the 2nd paragraph of section 39-1.03E with:**

04-20-12

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.

**Add between the 3rd and 4th paragraphs of section 39-1.03E:**

04-20-12

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:

$$\text{Asphalt Binder Set Point} = \frac{\frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)} - R_{RAP} \left[ \frac{BC_{RAP}}{\left(1 - \frac{BC_{RAP}}{100}\right)} \right]}{100 + \frac{BC_{OBC}}{\left(1 - \frac{BC_{OBC}}{100}\right)}}$$

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  $\pm 2.0$  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.

**Replace the 16th paragraph of section 39-1.03E with:**

02-22-13

Except for RAP substitution rate greater than 15 percent, for any HMA produced under the QC/QA process the Department does not use California Test 371 test results for verification.

**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  $\pm 2.0$  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 "batch" in the 2nd sentence in the 2nd paragraph of section 39-1.04C with:**

07-19-13

lot. Each asphalt binder lot consist of 1 or multiple batches of combined asphalt binder, asphalt modifier, and CRM proportioned under section 39-1.02D.

**Replace the 2nd paragraph of section 39-1.04E with:**

02-22-13

For RAP substitution rate of 15 percent or less, sample RAP once daily.

For RAP substitution rate of greater than 15percent, sample processed RAP twice daily.

Perform QC testing for processed RAP aggregate gradation under California Test 367, appendix B, and submit the results with the combined aggregate gradation.

**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.

07-19-13

For RAP substitution rate of 15 percent or less, you may adjust the RAP by -5 percent.

For RAP substitution greater than 15, you may adjust the RAP by -3 percent.

04-20-12

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.

**Add to the beginning of section 39-1.08C:**

07-19-13

Asphalt rubber binder blending plants must have current qualification under the Department's Material Plant Quality Program.

**Replace section 39-1.11 with:**

01-18-13

**39-1.11 CONSTRUCTION**

**39-1.11A General**

Do not place HMA on wet pavement or a frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pickup, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

### **39-1.11B Longitudinal Joints**

#### **39-1.11B(1) General**

Longitudinal joints in the top layer must match specified lane edges. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the specified lane edges. You may request other longitudinal joint placement patterns.

A vertical longitudinal joint of more than 0.15 ft is not allowed at any time between adjacent lanes open to traffic.

For HMA thickness of 0.15 ft or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For HMA thickness greater than 0.15 ft, you must place HMA on adjacent traveled way lanes so that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place Kraft paper or another authorized bond breaker under the conform tapers to facilitate the taper removal when paving operations resume.

#### **39-1.11B(2) Tapered Notched Wedge**

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.

The tapered notched wedge must retain its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

Perform QC testing on the completed tapered notch wedge joint as follows:

1. Perform field compaction tests at the rate of 1 test for each 750-foot section along the joint. Select random locations for testing within each 750-foot section.
2. Perform field compaction tests at the centerline of the joint, 6 inches from the upper vertical notch, after the adjacent lane is placed and before opening the pavement to traffic.
3. Determine maximum density test results.
4. Determine percent compaction of the longitudinal joint as the ratio of the average of the field compaction values and the maximum density test results.

For HMA under QC/QA construction process, the additional quality control compaction results associated with the tapered notch wedge will not be included in the computation of any quality factor and process control.

For acceptance of the completed tapered notch wedge joint, take two 4- or 6-inch diameter cores 6 inches from the upper vertical notch of the completed longitudinal joint for every 3,000 feet at locations designated by the Engineer. Take cores after the adjacent lane is placed and before opening the pavement to traffic. Cores must be taken in the presence of the Engineer and must be marked to identify the test sites. Submit the cores. One core will be used for determination of the field density and 1 core will be used for dispute resolution. The Engineer determines:

1. Field compaction by measuring the bulk specific gravity of the cores under California Test 308, Method A
2. Percent compaction as the ratio of the average of the bulk specific gravity of the core for each day's production to the maximum density test value

For HMA under QC/QA construction process, the additional quality assurance testing by the Engineer to determine field compaction associated with the tapered notch wedge will not be included in the Engineer's verification testing and in the computation of any quality factor and process control.

Determine percent compaction values each day the joint is completed and submit values within 24 hours of testing. If the percent compaction of 1 day's production is less than 91 percent, that day's notched wedge joint is rejected. Discontinue placement of the tapered notched wedge and notify the Engineer of changes you will make to your construction process in order to meet the specifications.

For HMA under QC/QA construction process, quantities of HMA placed in the completed longitudinal joint will have a quality factor  $QF_{QC5}$  of 1.0.

#### **39-1.11C Widening Existing Pavement**

If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

#### **39-1.11D Shoulders, Medians, and Other Road Connections**

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

#### **39-1.11E Leveling**

If leveling with HMA is specified, fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as HMA (leveling).

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material.

#### **39-1.11F Compaction**

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving. Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder
3. Below 200 degrees F for RHMA-G

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not use a pneumatic-tired roller to compact RHMA-G.

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.

Spread and compact HMA under sections 39-3.03 and 39-3.04 if any of the following applies:

1. Specified paved thickness is less than 0.15 foot.

2. Specified paved thickness is less than 0.20 foot and 3/4-inch aggregate grading is specified and used.
3. You spread and compact at:
  - 3.1. Asphalt concrete surfacing replacement areas
  - 3.2. Leveling courses
  - 3.3. Areas for which the Engineer determines conventional compaction and compaction measurement methods are impeded

Do not open new HMA pavement to public traffic until its mid-depth temperature is below 160 degrees F.

If you request and if authorized, you may cool HMA Type A and Type B with water when rolling activities are complete. Apply water under section 17-3.

Spread sand at a rate from 1 to 2 lb/sq yd on new RHMA-G, RHMA-O, and RHMA-O-HB pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(4)(c). Keep traffic off the pavement until spreading sand is complete.

**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:**

02-22-13

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 <sup>a</sup>	California Test 202	1 per 750 tons and any remaining part at the end of the project	JMF ± Tolerance <sup>b</sup>			
Sand equivalent (min) <sup>c</sup>	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) <sup>d,e</sup>	QC plan	2 per business day (min.)	91–97	91–97	91–97	--
Stabilometer value (min) <sup>c</sup> No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	1 per 4,000 tons or 2 per 5 business days, whichever is greater	30	30	--	--
			37	35	23	--
Air void content (%) <sup>c,f</sup>	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 <sup>g</sup>	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
Los Angeles Rattler (% max) Loss at 100 rev.	California Test 211		70	20	70	90
			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) <sup>h</sup>	California Test 234		45	45	45	--
Voids filled with asphalt (%) <sup>i</sup> 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) <sup>i</sup> 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	--
Dust proportion <sup>l</sup> 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	--
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is more	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--	--
Hamburg wheel track (inflection point minimum number of passes) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is more	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--
Moisture susceptibility (minimum dry strength, psi) <sup>j</sup>	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--
Moisture susceptibility (tensile strength ratio, %) <sup>j</sup>	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1	70	70	--	--

		per project whichever is greater				
Smoothness	Section 39-1.12	--	12-foot straight- edge, must grind, and PI <sub>0</sub>			
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

<sup>a</sup> Determine combined aggregate gradation containing RAP under California Test 367.

<sup>b</sup> The tolerances must comply with the allowable tolerances in section 39-1.02E.

<sup>c</sup> Report the average of 3 tests from a single split sample.

<sup>d</sup> 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.

<sup>e</sup> 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.

<sup>f</sup> 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.

<sup>g</sup> For adjusting the plant controller at the HMA plant.

<sup>h</sup> 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.

<sup>i</sup> Report only.

<sup>j</sup> Applies to RAP substitution rate greater than 15 percent.

**Replace the 1st paragraph of section 39-2.03A with:**

02-22-13

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 <sup>a</sup>	California Test 202	JMF ± tolerance <sup>c</sup>	JMF ± tolerance <sup>c</sup>	JMF ± tolerance <sup>c</sup>	JMF ± tolerance <sup>c</sup>			
Sieve						3/4"	1/2"	3/8"
1/2"						X <sup>b</sup>		
3/8"							X	
No. 4								X
No. 8						X	X	X
No. 200	X	X	X					
Sand equivalent (min) <sup>d</sup>	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) <sup>e, f</sup>	California Test 375	91–97	91–97	91–97	--			
Stabilometer value (min) <sup>d</sup> No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30 37	30 35	-- 23	-- --			
Air void content (%) <sup>d, g</sup>	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	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			
Fine aggregate angularity (% min) <sup>h</sup>	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 (%) <sup>i</sup> 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) <sup>i</sup> 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	--			
Dust proportion <sup>i</sup>	California			Report only	--			

No. 4 and 3/8" gradings 1/2" and 3/4" gradings	Test 367	0.6-1.2 0.6-1.2	0.6-1.2 0.6-1.2		
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--	--
Hamburg wheel track (inflection point minimum number of passes) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--
Moisture susceptibility (minimum dry strength, psi) <sup>j</sup>	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ration, %) <sup>j</sup>	California Test 371	70	70	--	--
Smoothness	Section 39-1.12	12-foot straight- edge, must grind, and PI <sub>0</sub>	12-foot straight- edge, must grind, and PI <sub>0</sub>	12-foot straight- edge, must grind, and PI <sub>0</sub>	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

<sup>a</sup> The Engineer determines combined aggregate gradations containing RAP under California Test 367.

<sup>b</sup> "X" denotes the sieves the Engineer tests for the specified aggregate gradation.

<sup>c</sup> The tolerances must comply with the allowable tolerances in section 39-1.02E.

<sup>d</sup> The Engineer reports the average of 3 tests from a single split sample.

<sup>e</sup> 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.

<sup>f</sup> 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.

<sup>g</sup> 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.

<sup>h</sup> 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.

<sup>i</sup> Report only.

<sup>j</sup> Applies to RAP substitution rate greater than 15 percent.

**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:**

02-22-13

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 <sup>a</sup>	California Test 202	JMF ± tolerance <sup>b</sup>	JMF ± tolerance <sup>b</sup>	JMF ± tolerance <sup>b</sup>	JMF ± tolerance <sup>b</sup>
Sand equivalent (min) <sup>c</sup>	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) <sup>c</sup> 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 (%) <sup>c, d</sup>	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min) <sup>e</sup>	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 (%) <sup>f</sup> 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) <sup>f</sup> 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	--
Dust proportion <sup>f</sup> 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	--
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) <sup>g</sup> PG-58 PG-64	AASHTO T 324 (Modified)	10,000 15,000	10,000 15,000	--	--

PG-70 PG-76 or higher		20,000 25,000	20,000 25,000		
Hamburg wheel track (inflection point minimum number of passes) <sup>g</sup>	AASHTO T 324 (Modified)			--	--
PG-58		10,000	10,000		
PG-64		10,000	10,000		
PG-70		12,500	12,500		
PG-76 or higher		15000	15000		
Moisture susceptibility (minimum dry strength, psi) <sup>g</sup>	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ration, %) <sup>g</sup>	California Test 371	70	70	--	--
Smoothness	Section 39-1.12	12-foot straight- edge and must-grind	12-foot straight- edge and must-grind	12-foot straight- edge and must-grind	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

<sup>a</sup> The Engineer determines combined aggregate gradations containing RAP under California Test 367.

<sup>b</sup> The tolerances must comply with the allowable tolerances in section 39-1.02E.

<sup>c</sup> The Engineer reports the average of 3 tests from a single split sample.

<sup>d</sup> 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.

<sup>e</sup> 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.

<sup>f</sup> Report only.

<sup>g</sup> Applies to RAP substitution rate greater than 15 percent.

**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 "5,000" in the 5th paragraph of section 39-4.02C with:**

10,000

02-22-13

**Replace the 7th paragraph of section 39-4.02C with:**

Except for RAP substitution rate of greater than 15 percent, the Department does not use results from California Test 371 to determine specification compliance.

02-22-13

**Replace the 8th paragraph of section 39-4.02C with:**

02-22-13

Comply with the values for the HMA quality characteristics and minimum random sampling and testing for quality control shown in the following table:

**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 <sup>a</sup>	California Test 202	1 per 750 tons	JMF ± tolerance <sup>b</sup>	JMF ± tolerance <sup>b</sup>	JMF ± tolerance <sup>b</sup>	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) <sup>c,d</sup>	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 <sup>e</sup>	California Test 226 or 370	2 per day during production	--	--	--	Stock-piles or cold feed belts	--
Sand equivalent (min) <sup>f</sup>	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) <sup>f</sup>	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 (%) <sup>f,g</sup>	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	As designated in QC plan.  At least once per project.	90	25	--	California Test 125	48 hours
			75	--	90		
Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve): One fractured face			70	20	70		
Los Angeles Rattler (% max): Loss at 100 rev. Loss at 500 rev.	California Test 211		12	--	12	California Test 125	
			45	50	40		
Fine aggregate angularity (% min) <sup>n</sup>	California Test 234		45	45	45	California Test 125	
Flat and elongated particle (% max by weight @ 5:1)	California Test 235		Report only	Report only	Report only	California Test 125	
Voids filled with asphalt (%) <sup>i</sup>  No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367				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				
		65.0–75.0	65.0–75.0				
Voids in mineral aggregate (% min.) <sup>i</sup>  No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367						
		17.0	17.0	--			
		15.0	15.0	--			
		14.0	14.0	18.0–23.0			
		13.0	13.0	18.0–23.0			

Dust proportion <sup>i</sup>  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		
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) <sup>i</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is greater	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--	--	
Hamburg wheel track (inflection point minimum number of passes) <sup>i</sup> PG-58 PG-64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever is greater	10,000 10,000 12,500 15000	10,000 10,000 12,500 15000	--	--	
Moisture susceptibility (minimum dry strength, psi) <sup>j</sup>	California Test 371	1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--	
Moisture susceptibility (tensile strength ratio, %) <sup>j</sup>	California Test 371	1 per 10,000 tons or 1 per project whichever is greater	70	70	70	--	
Smoothness	Section 39-1.12	--	12-foot straight-edge, must-grind, and PI <sub>0</sub>	12-foot straight-edge, must-grind, and PI <sub>0</sub>	12-foot straight-edge, must-grind, and PI <sub>0</sub>	--	
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

- <sup>a</sup> Determine combined aggregate gradation containing RAP under California Test 367.
- <sup>b</sup> The tolerances must comply with the allowable tolerances in section 39-1.02E.
- <sup>c</sup> 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.
- <sup>d</sup> 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.
- <sup>e</sup> For adjusting the plant controller at the HMA plant.
- <sup>f</sup> Report the average of 3 tests from a single split sample.
- <sup>g</sup> 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.
- <sup>h</sup> 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.
- <sup>i</sup> Report only.
- <sup>j</sup> Applies to RAP substitution rate greater than 15 percent.

**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:**

02-22-13

The Engineer samples for acceptance testing and tests for the following quality characteristics:

**HMA Acceptance—QC/QA Construction Process**

Index (i)	Quality characteristic				Weight -ing factor (w)	Test method	HMA type		
							A	B	RHMA-G
		Aggregate gradation <sup>a</sup>				California Test 202	JMF ± Tolerance <sup>c</sup>		
	Sieve	3/4"	1/2"	3/8"					
1	1/2"	X <sup>b</sup>	--	--	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) <sup>d, e</sup>				0.40	California Test 375	92–96	92–96	91–96
	Sand equivalent (min) <sup>f</sup>					California Test 217	47	42	47
	Stabilometer value (min) <sup>f</sup> No. 4 and 3/8" gradings 1/2" and 3/4" gradings					California Test 366	30 37	30 35	-- 23
	Air void content (%) <sup>f, g</sup>					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	25 --	-- 90
	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) <sup>h</sup>					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) <sup>i</sup> 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 (%) <sup>i</sup> 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 <sup>1</sup> 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
	Hamburg Wheel Tracker (minimum number of passes at 0.5 inch average rut depth) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher		AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--
	Hamburg Wheel Tracker (inflection point minimum number of passes) <sup>j</sup> PG-58 PG-64 PG-70 PG-76 or higher		AASHTO T 324 (Modified)	10,000 15,000 20,000 25,000	10,000 15,000 20,000 25,000	--
	Moisture susceptibility (minimum dry strength, psi) <sup>j</sup>		California Test 371	120	120	--
	Moisture susceptibility (tensile strength ratio %) <sup>j</sup>		California Test 371	70	70	70
	Smoothness		Section 39-1.12	12-foot straight- edge, must grind, and PI <sub>0</sub>	12-foot straight- edge, must grind, and PI <sub>0</sub>	12-foot straight- edge, must grind, and PI <sub>0</sub>
	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



**suspension limit:** Value at which production must be suspended while corrections are made.

#### **40-1.01C Submittals**

##### **40-1.01C(1) General**

At least 15 days before delivery to the job site, submit manufacturer's recommendations and instructions for storage and installation of:

1. Threaded tie bar splice couplers
2. Joint filler

As an informational submittal, submit calibration documentation and operational guidelines for frequency measuring devices (tachometer) for concrete consolidation vibrators.

Submit updated quality control charts each paving day.

##### **40-1.01C(2) Certificates of Compliance**

Submit a certificate of compliance for:

1. Tie bars
2. Threaded tie bar splice couplers
3. Dowel bars
4. Tie bar baskets
5. Dowel bar baskets
6. Joint filler
7. Epoxy powder coating

##### **40-1.01C(3) Quality Control Plan**

Submit a concrete pavement QC plan. Allow 30 days for review.

##### **40-1.01C(4) Mix Design**

At least 15 days before testing for mix proportions, submit a copy of the AASHTO accreditation for your laboratory determining the mix proportions. At least 15 days before starting field qualification, submit the proposed concrete mix proportions, the corresponding mix identifications, and laboratory test reports including the modulus of rupture for each trial mixture at 10, 21, 28, and 42 days.

##### **40-1.01C(5) Concrete 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. The minimum batch size is 5 cu yd.
4. Type and source of ingredients used
5. Penetration of the concrete
6. Air content of the plastic concrete
7. Age and strength at time of concrete beam testing

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

##### **40-1.01C(6) Cores**

Submit for authorization the name of the laboratory you propose to use for testing the cores for air content.

Submit each core in an individual plastic bag marked with a location description.

##### **40-1.01C(7) Profile Data and Straightedge Measurements**

At least 5 business days before start of initial profiling or changing profiler or operator, submit:

1. Inertial profiler (IP) certification issued by the Department. The certification must not be more than 12 months old.

2. Operator certification for the IP issued by the Department. The operator must be certified for each different model of IP device operated. The certification must not be more than 12 months old.
3. List of manufacturer's recommended test procedures for IP calibration and verification.

Within 2 business days after cross correlation testing, submit ProVAL profiler certification analysis report for cross correlation test results performed on test section. ProVAL is FHWA's software. Submit the certification analysis report to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days after each day of inertial profiling, submit profile data to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days of performing straightedge testing, submit a report of areas requiring smoothness correction.

#### **40-1.01C(8)–40-1.01C(12) Reserved**

#### **40-1.01D Quality Control and Assurance**

##### **40-1.01D(1) General**

If the pavement quantity is at least 2000 cu yd, provide a QC manager.

Core pavement as described for, thickness, bar placement, and air content.

For the Department's modulus of rupture testing, assist the Engineer in fabricating test beams by providing materials and labor.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic. 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 at least 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

##### **40-1.01D(2) Prepaving Conference**

Schedule a prepaving conference at a mutually agreed upon time and place to meet with the Engineer. Make the arrangements for the conference facility. Discuss QC plan and methods of performing each item of the work.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. QC manager
3. Paving construction foreman
4. Workers and your subcontractor's workers, including:
  - 4.1. Foremen including subcontractor's Foremen
  - 4.2. Concrete plant manager
  - 4.3. Concrete plant operator

Do not start paving activities including test strips until the listed personnel have attended a prepaving conference.

##### **40-1.01D(3) Just-In-Time-Training**

Reserved

#### **40-1.01D(4) Quality Control Plan**

Establish, implement, and maintain a QC plan for pavement. The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include action and suspension limits and details of corrective action to be taken if any process is out of those limits. Suspension limits must not exceed specified acceptance criteria.

The QC plan must address the elements affecting concrete pavement quality including:

1. Mix proportions
2. Aggregate gradation
3. Materials quality
4. Stockpile management
5. Line and grade control
6. Proportioning
7. Mixing and transportation
8. Placing and consolidation
9. Contraction and construction joints
10. Bar reinforcement placement and alignment
11. Dowel bar placement, alignment, and anchorage
12. Tie bar placement
13. Modulus of rupture
14. Finishing and curing
15. Protecting pavement
16. Surface smoothness

#### **40-1.01D(5) Mix Design**

Use a laboratory that complies with ASTM C 1077 to determine the mix proportions for concrete pavement. The laboratory must have a current AASHTO accreditation for:

1. AASHTO T 97 or ASTM C 78
2. ASTM C 192/C 192M

Make trial mixtures no more than 24 months before field qualification.

Using your trial mixtures, 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).

To determine the minimum cementitious materials content or maximum water to cementitious materials ratio, use modulus of rupture values of at least 570 psi for 28 days age and at least 650 psi for 42 days age.

If changing an aggregate supply source or the mix proportions, produce a trial batch and field-qualify the new concrete. The Engineer does not adjust contract time for performing sampling, testing, and qualifying new mix proportions or changing an aggregate supply source.

#### **40-1.01D(6) Quality Control Testing**

##### **40-1.01D(6)(a) General**

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

##### **40-1.01D(6)(b) Concrete Mix**

Before placing pavement, your mix design must be field qualified. Use an ACI certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations. Test for modulus of rupture under California Test 523 at 10, 21, and 28 days of age.

When placing pavement, your quality control must include testing properties at the frequencies shown in the following table:

**QC Testing Frequency**

Property	Test method	Minimum frequency
Cleanness value	California Test 227	2 per day
Sand equivalent	California Test 217	2 per day
Aggregate gradation	California Test 202	2 per day
Air content (air entrainment specified)	California Test 504	1 per hour
Air content (air entrainment not specified)	California Test 504	1 per 4 hours
Density	California Test 518	1 per 4 hours
Penetration	California Test 533	1 per 4 hours
Aggregate moisture meter calibration <sup>a</sup>	California Test 223 or California Test 226	1 per day

<sup>a</sup> Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

Maintain control charts to identify potential problems and assignable causes. Post a copy of each control chart at a location determined by the Engineer.

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is  $\pm 1.0$  percent of the specified value. If no value is specified, the action limit is  $\pm 1.0$  percent of the value used for your approved mix design.

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.

Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

#### **40-1.01D(6)(c) Pavement Smoothness**

##### **40-1.01D(6)(c)(i) General**

Notify the Engineer 2 business days before performing smoothness testing including IP calibration and verification testing. The notification must include start time and locations by station.

Before testing the pavement smoothness, remove foreign objects from the surface, and mark the beginning and ending station on the pavement shoulder.

Test pavement smoothness using an IP except use a 12-foot straightedge at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. Areas within 15 feet of manholes
3. Shoulders
4. Weigh-in-motion areas
5. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

##### **40-1.01D(6)(c)(ii) Straightedge Testing**

Identify locations of areas requiring correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
  - 4.1. Lane direction as NB, SB, EB, or WB
  - 4.2. Lane number from left to right in direction of travel
  - 4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
  - 5.1. Identify pavement area (e.g., shoulder, weight station, turnout)
  - 5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area

##### **40-1.01D(6)(c)(iii) Inertial Profile Testing**

IP equipment must display a current certification decal with expiration date.

Conduct cross correlation IP verification test in the Engineer's presence before performing initial profiling. Verify cross correlation IP verification test at least annually. Conduct 5 repeat runs of the IP on an authorized test section. The test section must be on an existing concrete pavement surface 0.1 mile long. Calculate a cross correlation to determine the repeatability of your device under Section 8.3.1.2 of AASHTO R 56 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross correlation must be a minimum of 0.92.

Conduct the following IP calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under AASHTO R 57, section 5.3.2.3.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under AASHTO R 57, section 5.3.2.3.2.
3. DMI test. Calibrate the accuracy of the testing procedure under AASHTO R 56, section 8.4.
4. Manufacturer's recommended tests.

Collect IP data using the specified ProVAL analysis with 250 mm and IRI filters. Comply with the requirements for data collection under AASHTO R 56.

For IP testing, wheel paths are 3 feet from and parallel to the edge of a lane. Left and right are relative to the direction of travel. The IRI is the pavement smoothness along a wheel path of a given lane. The MRI is the average of the IRI values for the left and right wheel path from the same lane.

Operate the IP according to the manufacturer's recommendations and AASHTO R 57 at 1-inch recording intervals and a minimum 4 inch line laser sensor.

Collect IP data under AASHTO R 56. IP data must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the international roughness index (IRI) of left and right wheel paths of each lane. Submit in pdf file format.
3. ProVAL ride quality analysis report for the mean roughness index (MRI) of each lane. Submit in pdf file format.
4. ProVAL smoothness assurance analysis report for IRIs of left wheel path. Submit in pdf file format.
5. ProVAL smoothness assurance analysis report for IRIs of right wheel path. Submit in pdf file format.
6. GPS data file for each lane in GPS exchange. Submit in GPS eXchange file format.
7. Manufacturer's recommended IP calibration and verification tests results.
8. AASHTO IP calibration and verification test results including bounce, block, and distance measurement instrument (DMI).

Submit the IP raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD\_TTCCRRR\_D\_L\_W\_S\_X\_PT.PPF

where:

YYYY = year

MM = Month, leading zero

DD = Day of month, leading zero

TT = District, leading zero

CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08

RRR = Route number, no leading zeros

D = Traffic direction as NB, SB, WB, or EB

L = Lane number from left to right in direction of travel

W = Wheel path as "L" for left, "R" for right, or "B" for both

S = Beginning station to the nearest foot (e.g., 10+20) or beginning post mile to the nearest hundredth (e.g., 25.06) no leading zero

X = Profile operation as "EXIST" for existing pavement, "PAVE" for after paving, or "CORR" for after final surface pavement correction

PT = Pavement type (e.g., "concrete", etc.)

Determine IRIs using the ProVAL ride quality analysis with a 250 mm and IRI filters. While collecting the profile data to determine IRI, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface

For each 0.1 mile section, your IRI values must be within 10 percent of the Department's IRI values. The Engineer may order you to recalibrate your IP equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your IP operator.

Determine the MRI for 0.1-mile fixed sections. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surface must comply with the MRI specifications for a full section. Adjust the MRI for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness. Use the ProVAL smoothness assurance with a continuous IRI for each wheel path, 25-foot interval, and 250 mm and IRI filters.

**40-1.01D(6)(c)(iv) Reserved**

**40-1.01D(6)(d)–40-1.01D(6)(h) Reserved**

**40-1.01D(7) Pavement Acceptance**

**40-1.01D(7)(a) Acceptance Testing**

**40-1.01D(7)(a)(i) General**

The Department's acceptance testing includes testing the pavement properties at the minimum frequencies shown in the following table:

Property	Test Method		Frequency <sup>a</sup>
	CRCP	JPCP	
Modulus of rupture (28 day)	California Test 523		1,000 cu yd
Air content <sup>b</sup>	California Test 504		1 day's paving
Dowel bar placement	--	Measurement <sup>a</sup>	700 sq yd
Tie bar placement	--	Measurement <sup>a</sup>	4,000 sq yd
Thickness	California Test 531		1,200 sq yd
Coefficient of friction	California Test 342		1 day's paving

<sup>a</sup>A single test represents no more than the frequency specified.

<sup>b</sup>Tested only when air entrainment is specified.

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

**40-1.01D(7)(a)(ii) Air Content**

If air-entraining admixtures are specified, the Engineer uses a t-test to compare your QC test results with the Department's test results. The t-value for test data is determined using the following equation:

where:

- $n_c$  = Number of your quality control tests (minimum of 6 required)
- $n_v$  = Number of Department's tests (minimum of 2 required)
-  = Mean of your quality control tests
-  = Mean of the Department's tests
- $S_p$  = Pooled standard deviation  
(When  $n_v = 1$ ,  $S_p = S_c$ )
- $S_c$  = Standard deviation of your quality control tests
- $S_v$  = Standard deviation of the Department's tests (when  $n_v > 1$ )

The Engineer compares your QC test results with the Department's test results at a level of significance of  $\alpha = 0.01$ . The Engineer compares the t-value to  $t_{crit}$ , using degrees of freedom showing in the following table:

degrees of freedom (nc+nv-2)	tcrit (for $\alpha = 0.01$ )
1	63.657
2	9.925
3	5.841
4	4.604
5	4.032
6	3.707
7	3.499
8	3.355
9	3.250
10	3.169

If the t-value calculated is less than or equal to tcrit, your quality control test results are verified. If the t-value calculated is greater than tcrit, quality control test results are not verified.

If your quality control test results are not verified, core at least 3 specimens from concrete pavement under section 40-1.03P. The Engineer selects the core locations. The authorized laboratory must test these specimens for air content under ASTM C 457. The Engineer compares these test results with your quality control test results using the t-test method. If your quality control test results are verified based on this comparison, the Engineer uses the quality control test results for acceptance of concrete pavement for air content. If your quality control test results are not verified based on this comparison, the Engineer uses the air content of core specimens determined by the authorized laboratory under ASTM C 457 for acceptance.

#### **40-1.01D(7)(a)(iii) Dowel and Tie Bar Placement**

For JPCP, drill cores under section 40-1.03P for the Department's acceptance testing.

The Engineer identifies which joint and dowel or tie bar are to be tested. Core each day's paving within 2 business days. Each dowel or tie bar test consists of 2 cores, 1 on each bar end to expose both ends and allow measurement.

If the tests indicate dowel or tie bars are not placed within the specified tolerances or if there is unconsolidated concrete around the dowel or tie bars, core additional specimens identified by Engineer to determine the limits of unacceptable work.

#### **40-1.01D(7)(a)(iv) Thickness**

Drill cores under section 40-1.03P for the Department's acceptance testing in the primary area, which is the area placed in 1 day for each thickness. Core at locations determined by the Engineer and in the Engineer's presence.

Do not core until any grinding has been completed.

The core specimen diameter must be 4 inches. To identify the limits of concrete pavement deficient in thickness by more than 0.05 foot, you may divide primary areas into secondary areas. The Engineer measures cores under California Test 531 to the nearest 0.01 foot. Core at least 1 foot from existing, contiguous, and parallel concrete pavement not constructed as part of this Contract.

You may request the Engineer make additional thickness measurements and use them to determine the average thickness variation. The Engineer determines the locations with random sampling methods.

If each thickness measurement in a primary area is less than 0.05 foot deficient, the Engineer calculates the average thickness deficiency in that primary area. The Engineer uses 0.02 foot for a thickness difference more than 0.02 foot over the specified thickness.

For each thickness measurement in a primary area deficient by more than 0.05 foot, the Engineer determines a secondary area where the thickness deficiency is more than 0.05 foot. The Engineer determines this secondary area by measuring the thickness of each concrete pavement slab adjacent to

the measurement found to be more than 0.05 foot deficient. The Engineer continues to measure the thickness until an area that is bound by slabs with thickness deficient by 0.05 foot or less is determined.

Slabs without bar reinforcement are defined by the areas bound by longitudinal and transverse joints and concrete pavement edges. Slabs with bar reinforcement are defined by the areas bound by longitudinal joints and concrete pavement edges and 15-foot lengths. Secondary area thickness measurements in a slab determine that entire slab's thickness.

The Engineer measures the remaining primary area thickness after removing the secondary areas from consideration for determining the average thickness deficiency.

**40-1.01D(7)(a)(v)–40-1.01D(7)(a)(ix) Reserved**

**40-1.01D(7)(b) Acceptance Criteria**

**40-1.01D(7)(b)(i) General**

Reserved

**40-1.01D(7)(b)(ii) Modulus of Rupture**

For field qualification, the modulus of rupture at no later than 28 days must be at least:

1. 550 psi for each single beam
2. 570 psi for the average of 5 beams

For production, the modulus of rupture for the average of the individual test results of 2 beams aged for 28 days must be at least 570 psi.

**40-1.01D(7)(b)(iii) Air Content**

The air content must be within  $\pm 1.5$  percent of the specified value. If no value is specified, the air content must be within  $\pm 1.5$  percent of, the value used for your approved mix design.

**40-1.01D(7)(b)(iv) Bar Reinforcement**

In addition to requirements of Section 52, bar reinforcement must be more than 1/2 inch below the saw cut depth at concrete pavement joints.

**40-1.01D(7)(b)(v) Dowel Bar and Tie Bar Placement**

Tie bar placement must comply with the tolerances shown in the following table:

<b>Tie Bar Tolerance</b>	
Dimension	Tolerance
Horizontal and vertical skew	5 1/4 inch, max
Longitudinal translation	$\pm 2$ inch
Horizontal offset (embedment)	$\pm 2$ inch
Vertical depth	<ol style="list-style-type: none"> <li>1. At least 1/2 inch below the bottom of the saw cut</li> <li>2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom</li> </ol>

NOTE: Tolerances are measured relative to the completed joint.

Dowel bar placement must comply with the tolerances shown in the following table:

### Dowel Bar Tolerances

Dimension	Tolerance
Horizontal offset	±1 inch
Longitudinal translation	±2 inch
Horizontal skew	5/8 inch, max
Vertical skew	5/8 inch, max
Vertical depth	<p>The minimum distance measured from concrete pavement surface to any point along the top of dowel bar must be: DB + 1/2 inch</p> <p>where: DB = one third of pavement thickness in inches, or the saw cut depth, whichever is greater</p> <p>The maximum distance below the depth shown must be 5/8 inch.</p>

NOTE: Tolerances are measured relative to the completed joint.

The Engineer determines the limits for removal and replacement.

#### **40-1.01D(7)(b)(vi) Pavement Thickness**

Concrete pavement thickness must not be deficient by more than 0.05 foot.

The minimum thickness is not reduced for specifications that may affect concrete pavement thickness such as allowable tolerances for subgrade construction.

The Engineer determines the areas of noncompliant pavement, the thickness deficiencies, and the limits where removal is required.

Pavement with an average thickness deficiency less than 0.01 foot is acceptable. If the thickness deficiency is 0.01 foot or more and less than 0.05 foot, you may request authorization to leave the pavement in place and accept a pay adjustment. If the deficiency is more than 0.05 foot the pavement must be removed and replaced.

#### **40-1.01D(7)(b)(vii) Pavement Smoothness**

Where testing with an IP is required, the pavement surface must have:

1. No areas of localized roughness with an IRI greater than 120 in/mi
2. MRI of 60 in/mi or less within a 0.1 mile section

Where testing with a straightedge is required, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

#### **40-1.01D(7)(b)(viii) Coefficient of Friction**

Initial and final texturing must produce a coefficient of friction of at least 0.30. Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

**40-1.01D(7)(b)(ix)–40-1.01D(7)(b)(xii) Reserved**

**40-1.02 MATERIALS**

**40-1.02A General**

Water for coring must comply with section 90.

Tack coat must comply with section 39.

**40-1.02B Concrete**

**40-1.02B(1) General**

PCC for pavement must comply with section 90-1 except as otherwise specified.

**40-1.02B(2) Cementitious Material**

Concrete must contain from 505 pounds to 675 pounds cementitious material per cubic yard. The specifications for reducing cementitious material content in section 90-1.02E(2) do not apply .

**40-1.02B(3) Aggregate**

Aggregate must comply with section 90-1.02C except the specifications for reduction in operating range and contract compliance for cleanness value and sand equivalent specified in section 90-1.02C(2) and section 90-1.02C(3) do not apply.

For coarse aggregate in high desert and high mountain climate regions, the loss must not exceed 25 percent when tested under California Test 211 with 500 revolutions.

For combined aggregate gradings, the difference between the percent passing the 3/8-inch sieve and the percent passing the no. 8 sieve must not be less than 16 percent of the total aggregate.

**40-1.02B(4) Air Entrainment**

The second paragraph of section 90-1.02I(2)(a) does not apply.

For a project shown in the low and south mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 4 percent in the freshly mixed concrete.

For a project shown in the high desert and high mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 6 percent in the freshly mixed concrete.

**40-1.02B(5)–40-1.02B(8) Reserved**

**40-1.02C Reinforcement, Bars, and Baskets**

**40-1.02C(1) Bar Reinforcement**

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

**40-1.02C(2) Dowel Bars**

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 solid stainless-steel bars under ASTM A 955/A 955M, 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 solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

#### **40-1.02C(3) Tie Bars**

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 solid stainless-steel bars under ASTM A 955/A 955M, 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 solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02, or section 52-2.03.

Do not bend tie bars.

#### **40-1.02C(4) Dowel and Tie Bar Baskets**

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 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 52-2.02 or 52-2.03.

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.

**40-1.02D Dowel Bar Lubricant**

Dowel bar lubricant must be petroleum paraffin based or a curing compound. Paraffin-based lubricant must be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal and must be factory-applied. Curing compound must be curing compound no. 3.

**40-1.02E Joint Filler**

Joint filler for isolation joint must be preformed expansion joint filler for concrete (bituminous type) under ASTM D 994.

**40-1.02F Curing Compound**

Curing compound must be curing compound no. 1 or 2.

**40-1.02G Nonshrink Hydraulic Cement Grout**

Nonshrink hydraulic cement grout must comply with ASTM C 1107/C 1107M. Clean, uniform, rounded aggregate filler may be used to extend the grout. Aggregate filler must not exceed 60 percent of the grout mass or the maximum recommended by the manufacturer, whichever is less. Aggregate filler moisture content must not exceed 0.5 percent when tested under California Test 223 or California Test 226. Aggregate filler tested under California Test 202 must comply with the grading shown in the following table:

Sieve size	Percentage passing
1/2-inch	100
3/8-inch	85–100
No. 4	10–30
No. 8	0–10
No. 16	0–5

**40-1.02H Temporary Roadway Pavement Structure**

Temporary roadway pavement structure must comply with section 41-1.02E.

**40-1.02I–40-1.02N Reserved**

**40-1.03 CONSTRUCTION**

**40-1.03A General**

Aggregate and bulk cementitious material must be proportioned by weight by means of automatic proportioning devices of approved types.

For widenings and lane reconstruction, construct only the portion of pavement where the work will be completed during the same lane closure. If you fail to complete the construction during the same lane closure, construct a temporary pavement structure under section 41-1.

**40-1.03B Water Supply**

Before placing concrete pavement, develop enough water supply.

**40-1.03C Test Strips**

Construct a test strip for each type of pavement with a quantity of more than 2,000 cu yd. Obtain authorization of the test strip before constructing pavement. Test strips must be:

1. 700 to 1,000 feet long
2. Same width as the planned paving, and
3. Constructed using the same equipment proposed for paving

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.

Test strips must comply with the acceptance criteria for:

1. Smoothness, except IP is not required
2. Dowel bars and tie bars placement
3. Pavement thickness
4. Final finishing, except the coefficient of friction is not considered

Allow 3 business days for evaluation. If the test strip is noncompliant, stop paving and submit a plan for changed materials, methods, or equipment. Allow 3 business days for authorization of the plan. Construct another test strip per the authorized plan.

Remove and dispose of noncompliant test strips.

If the test strip is compliant except for smoothness and final finishing, you may grind the surface. After grinding retest the test strip smoothness under section 40-1.01D(6)(c).

If the test strip is compliant for smoothness and thickness, construction of an additional test strip is not required and the test strip may remain in place.

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.

#### **40-1.03D Joints**

##### **40-1.03D(1) General**

Do not bend tie bars or reinforcement in existing concrete pavement joints.

For contraction joints and isolation joints, saw cut a groove with a power-driven saw. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Keep joints free from foreign material including soil, gravel, concrete, and asphalt. To keep foreign material out of the joint, you may use filler material. Filler material must not react adversely with the concrete or cause concrete pavement damage. After sawing and washing, install filler material that keeps moisture in the adjacent concrete during the 72 hours after paving. If you install filler material, the specifications for spraying the sawed joint with additional curing compound in section 40-1.03K does not apply. If using absorptive filler material, moisten the filler immediately before or after installation.

##### **40-1.03D(2) Construction Joints**

Construction joints must be vertical.

Before placing fresh concrete against hardened concrete, existing concrete pavement, or structures, apply curing compound no. 1 or 2 to the vertical surface of the hardened concrete, existing concrete pavement, or structures and allow it to dry.

At joints between concrete pavement and HMA, apply tack coat between the concrete pavement and HMA.

Use a metal or wooden bulkhead to form transverse construction joints. If dowel bars are described, the bulkhead must allow dowel bar installation.

#### **40-1.03D(3) Contraction Joints**

Saw contraction joints before cracking occurs and after the concrete is hard enough to saw without spalling, raveling, or tearing.

Saw cut using a power saw with a diamond blade. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Except for longitudinal joints parallel to a curving centerline, transverse and longitudinal contraction joints must not deviate by more than 0.1 foot from either side of a 12-foot straight line

Cut transverse contraction joints within 0.5 foot of the spacing described. Adjust spacing if needed such that slabs are at least 10 feet long.

For widenings, do not match transverse contraction joints with existing joint spacing or skew unless otherwise described.

Cut transverse contraction joints straight across the full concrete pavement width, between isolation joints and edges of pavement. In areas of converging and diverging pavements, space transverse contraction joints such that the joint is continuous across the maximum pavement width. Longitudinal contraction joints must be parallel with the concrete pavement centerline, except when lanes converge or diverge.

#### **40-1.03D(4) Isolation Joints**

Before placing concrete at isolation joints, prepare the existing concrete face and secure joint filler. Prepare by saw cutting and making a clean flat vertical surface. Make the saw cut the same depth as the depth of the new pavement.

#### **40-1.03E Bar Reinforcement**

Place bar reinforcement under section 52.

#### **40-1.03F Dowel Bar Placement**

If using curing compound as lubricant, apply the curing compound to dowels in 2 separate applications. Lubricate each dowel bar entirely before placement. The last application must be applied not more than 8 hours before placing the dowel bars. Apply each curing compound application at a rate of 1 gallon per 150 square feet.

Install dowel bars using one of the following methods:

1. Drill and bond bars. Comply with section 41-10.
2. Mechanical insertion. Eliminate evidence of the insertion by reworking the concrete over the dowel bars.
3. Dowel bar baskets. Anchor baskets with fasteners. Use at least 1 fastener per foot for basket sections. Baskets must be anchored at least 200 feet in advance of the concrete placement activity unless your waiver request is authorized. If requesting a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before the concrete is placed, cut and remove temporary spacer wires and demonstrate the dowel bars do not move from their specified depth and alignment during concrete placement.

If dowel bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

#### **40-1.03G Tie Bar Placement**

Install tie bars at longitudinal joints using one of the following methods:

1. Drill and bond bars. Comply with section 41-10.
2. Insert bars. Mechanically insert tie bars into plastic slip-formed concrete before finishing. Inserted tie bars must have full contact between the bar and the concrete. Eliminate evidence of the insertion by reworking the concrete over the tie bars.
3. Threaded couplers. Threaded tie bar splice couplers must be fabricated from deformed bar reinforcement and free of external welding or machining.
4. 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.

If tie bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

#### **40-1.03H Placing Concrete**

##### **40-1.03H(1) General**

Immediately prior to placing concrete, the surface to receive concrete must be:

1. In compliance with specified requirements, including compaction and elevation tolerances
2. Free of loose and extraneous material
3. Uniformly moist, but free of standing or flowing water

Place concrete pavement with stationary side forms or slip-form paving equipment.

Place consecutive concrete loads within 30 minutes of each other. Construct a transverse construction joint when concrete placement is interrupted by more than 30 minutes. The transverse construction joint must coincide with the next contraction joint location, or you must remove fresh concrete pavement to the preceding transverse joint location.

Place concrete pavement in full slab widths separated by construction joints or monolithically in multiples of full lane widths with a longitudinal contraction joint at each traffic lane line.

Do not retemper concrete.

If the concrete pavement surface width is constructed as specified, you may construct concrete pavement sides on a batter not flatter than 6:1 (vertical:horizontal).

##### **40-1.03H(2) Paving Adjacent to Existing Concrete Pavement**

Where pavement is placed adjacent to existing concrete pavement:

1. Grinding adjacent pavement must be completed before placing the pavement
2. Use paving equipment with padded crawler tracks or rubber-tired wheels with enough offset to prevent damage
3. Match pavement grade with the elevation of existing concrete pavement after grinding.

##### **40-1.03H(3) Concrete Pavement Transition Panel**

For concrete pavement placed in a transition panel, texture the surface with a drag strip of burlap, broom, or spring steel tine device that produces scoring in the finished surface. Scoring must be either parallel or transverse to the centerline. Texture at the time that produces the coarsest texture.

##### **40-1.03H(4) Stationary Side Form Construction**

Stationary side forms must be straight and without defects including warps, bends, and indentations. Side forms must be metal except at end closures and transverse construction joints where other materials may be used.

You may build up side forms by attaching a section to the top or bottom. If attached to the top of metal forms, the attached section must be metal.

The side form's base width must be at least 80 percent of the specified concrete pavement thickness.

Side forms including interlocking connections with adjoining forms must be rigid enough to prevent springing from subgrading and paving equipment and concrete pressure.

Construct subgrade to final grade before placing side forms. Side forms must bear fully on the foundation throughout their length and base width. Place side forms to the specified grade and alignment of the finished concrete pavement's edge. Support side forms during concrete placing, compacting, and finishing.

After subgrade work is complete and immediately before placing concrete, true side forms and set to line and grade for a distance that avoids delays due to form adjustment.

Clean and oil side forms before each use.

Side forms must remain in place for at least 1 day after placing concrete and until the concrete pavement edge no longer requires protection from the forms.

Spread, screed, shape, and consolidate concrete with 1 or more machines. The machines must uniformly distribute and consolidate the concrete. The machines must operate to place the concrete pavement to the specified cross section with minimal hand work.

Consolidate the concrete without segregation. If vibrators are used:

1. The vibration rate must be at least 3,500 cycles per minute for surface vibrators and 5,000 cycles per minute for internal vibrators
2. Amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element
3. Use a calibrated tachometer for measuring frequency of vibration
4. Vibrators must not rest on side forms or new concrete pavement
5. Power to vibrators must automatically cease when forward or backward motion of the paving machine is stopped
6. Uniformly consolidate the concrete across the paving width including adjacent to forms by using high-frequency internal vibrators within 15 minutes of depositing concrete on the subgrade
7. Do not shift the mass of concrete with vibrators.

#### **40-1.03H(5) Slip-Form Construction**

If slip-form construction is used, spread, screed, shape, and consolidate concrete to the specified cross section with slip-form machines and minimal hand work. Slip-form paving machines must be equipped with traveling side forms and must not segregate the concrete.

Do not deviate from the specified concrete pavement alignment by more than 0.1 foot.

Slip-form paving machines must use high frequency internal vibrators to consolidate concrete. You may mount vibrators with their axes parallel or normal to the concrete pavement alignment. If mounted with axes parallel to the concrete pavement alignment, space vibrators no more than 2.5 feet measured center to center. If mounted with axes normal to the concrete pavement alignment, space the vibrators with a maximum 0.5-foot lateral clearance between individual vibrators.

Each vibrator must have a vibration rate from 5,000 to 8,000 cycles per minute. The amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element. Use a calibrated tachometer to measure frequency of vibration.

#### **40-1.03I Edge Treatment**

Construct edge treatments as shown. Regrade when required for the preparation of safety edge areas.

Sections 40-1.03J(2) and 40-1.03J(3) do not apply to safety edges.

For safety edges placed after the concrete pavement is complete, concrete may comply with the requirements for minor concrete.

For safety edges placed after the concrete pavement is complete, install connecting bar reinforcement under section 52.

Saw cutting or grinding may be used to construct safety edges.

For safety edges, the angle of the slope must not deviate by more than  $\pm 5$  degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

#### **40-1.03J Finishing**

##### **40-1.03J(1) General**

Reserved

#### **40-1.03J(2) Preliminary Finishing**

##### **40-1.03J(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  $20 \pm 5$  feet from the transverse construction joint formed at each day's start of paving and  $1 \pm 0.25$  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 water to the pavement surface before float finishing.

##### **40-1.03J(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 40-1.03L. 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.

##### **40-1.03J(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.

##### **40-1.03J(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 raveling.

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 using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

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.

#### **40-1.03K Curing**

Cure the concrete pavement's exposed area under section 90-1.03B using the waterproof membrane method or curing compound method. If using the curing compound method use curing compound no. 1 or 2. When side forms are removed within 72 hours of the start of curing, also cure the concrete pavement edges.

Apply curing compound with mechanical sprayers. Reapply curing compound to saw cuts and disturbed areas.

#### **40-1.03L Protecting Concrete Pavement**

Protect concrete pavement under section 90-1.03C.

Maintain the concrete pavement surface temperature at not less than 40 degrees F for the initial 72 hours.

Protect the concrete pavement surface from activities that cause damage and reduce texture and coefficient of friction. Do not allow soil, gravel, petroleum products, concrete, or asphalt mixes on the concrete pavement surface.

Construct crossings for traffic convenience. If authorized, you may use RSC for crossings. Do not open crossings until the Department determines that the pavement's modulus of rupture is at least 550 psi under California Test 523 or California Test 524.

Do not open concrete pavement to traffic or use equipment on the concrete pavement for 10 days after paving nor before the concrete has attained a modulus of rupture of 550 psi based on Department's testing except:

1. If the equipment is for sawing contraction joints
2. If authorized, one side of paving equipment's tracks may be on the concrete pavement after a modulus of rupture of 350 psi has been attained, provided:
  - 2.1. Unit pressure exerted on the concrete pavement by the paver does not exceed 20 psi
  - 2.2. You change the paving equipment tracks to prevent damage or the paving equipment tracks travel on protective material such as planks
  - 2.3. No part of the track is closer than 1 foot from the concrete pavement's edge

If concrete pavement damage including visible cracking occurs, stop operating paving equipment on the concrete pavement and repair the damage.

#### **40-1.03M Early Use of Concrete Pavement**

If requesting early use of concrete pavement:

1. Furnish molds and machines for modulus of rupture testing
2. Sample concrete
3. Fabricate beam specimens
4. Test for modulus of rupture under California Test 523

If you request early use, concrete pavement must have a modulus of rupture of at least 350 psi. Protect concrete pavement under section 40-1.03L.

#### **40-1.03N Reserved**

#### **40-1.03O Shoulder Rumble Strip**

##### **40-1.03O(1) General**

Construct shoulder rumble strips by rolling or grinding indentations in new concrete pavement.

Do not construct shoulder rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. Rumble strip equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Indentations must not vary from the specified dimensions by more than 1/16 inch in depth nor more than 10 percent in length and width.

Grind or remove and replace noncompliant rumble strip indentations at locations determined by the Engineer. Ground surface areas must be neat and uniform in appearance.

Remove grinding residue under section 42-1.03B.

#### **40-1.03O(2) Rolled-In Indentations**

Construct rolled-in indentations before final concrete set. Indentation construction must not displace adjacent concrete.

#### **40-1.03O(3) Ground-In Indentations**

Concrete pavement must be hardened before grinding rumble strips indentations. Do not construct indentations until the following occurs:

1. 10 days elapse after concrete placement
2. Concrete has developed a modulus of rupture of 550 psi determined under California Test 523,

#### **40-1.03P Drilling Cores**

Drill concrete pavement cores under ASTM C 42/C 42M. Use diamond impregnated drill bits.

Clean, dry, and fill core holes with hydraulic cement grout (nonshrink) or pavement concrete. Coat the core hole walls with epoxy adhesive for bonding new concrete to old concrete under section 95. Finish the backfill to match the adjacent surface elevation and texture.

#### **40-1.03Q Pavement Repair and Replacement**

##### **40-1.03Q(1) General**

If surface raveling or full-depth cracks occur within one year of Contract acceptance, repair or replace the pavement under section 6-3.06.

Repair and replace pavement in the following sequence:

1. Replace pavement
2. Repair spall, ravel, and working cracks
3. Correct smoothness and coefficient of friction
4. Treat partial depth cracks
5. Replace damaged joint seals under section 41-5

In addition to removing pavement for other noncompliance, remove and replace JPCP slabs that:

1. Have one or more full depth crack
2. Have raveled surfaces such that either:
  - 2.1. Combined raveled areas are more than 5 percent of the total slab area
  - 2.2. Single area is more than 4 sq ft

Remove and replace JPCP 3 feet on both sides of a joint with a rejected dowel bar.

##### **40-1.03Q(2) Spall and Ravel Repair**

Repair spalled or raveled areas that are:

1. Deeper than 0.05 foot
2. Wider than 0.10 foot
3. Longer than 0.3 foot

Repairs must comply with section 41-4 and be completed before opening pavement to traffic.

##### **40-1.03Q(3) Crack Repair**

Treat partial depth cracks for JPCP under section 41-3.

If the joints are sealed, repair working cracks by routing and sealing. Use a powered rotary router mounted on wheels, with a vertical shaft and a routing spindle that casters as it moves along the crack. Form a reservoir 3/4 inch deep by 3/8 inch wide in the crack. Equipment must not cause raveling nor spalling

Treat the contraction joint adjacent to the working crack by either:

1. Epoxy resin under ASTM C 881/C 881M, Type IV, Grade 2
2. Pressure injecting epoxy resin under ASTM C 881/C881M, Type IV, Grade 1

**40-1.03Q(4) Smoothness and Friction Correction**

Correct pavement that is noncompliant for:

1. Smoothness by grinding under section 42-3
2. Coefficient of friction by grooving or grinding under section 42

Do not start corrective work until:

1. Pavement has cured 10 days
2. Pavement has at least a 550 psi modulus of rupture
3. Your corrective method is authorized

Correct the entire lane width. Begin and end grinding at lines perpendicular to the roadway centerline. The corrected area must have a uniform texture and appearance.

If corrections are made within areas where testing with an IP is required, retest the entire lane length with an IP under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

If corrections are made within areas where testing with a 12-foot straightedge is required, retest the corrected area with a straightedge under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

Allow 25 days for the Department's coefficient of friction retesting.

**40-1.03R–40-1.03U Reserved**

**40-1.04 PAYMENT**

The payment quantity for pavement is based on the dimensions shown.

The deduction for pavement thickness deficiency in each primary area is shown in the following table:

<b>Deduction for Thickness Deficiency</b>	
Average thickness deficiency (foot) <sup>a</sup>	Deduction(\$/sq yd)
0.01	0.90
0.02	2.30
0.03	4.10
0.04	6.40
0.05	9.11

<sup>a</sup>Values greater than 0.01 are rounded to the nearest 0.01 foot.

Shoulder rumble strips are measured by the station along each shoulder on which the rumble strips are constructed without deductions for gaps between indentations.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel or tie bar coring, the additional cores are paid for as change order work.

The Department does not pay for additional coring to check dowel or tie bar alignment which you request.

If the Engineer accepts a test strip and it remains as part of the paving surface, the test strip is paid for as the type of pavement involved.

If the curvature of a slab affects tie bar spacing and additional tie bars are required, no additional payment is made for the additional tie bars.

Payment for grinding existing pavement is not included in the payment for the type of pavement involved.

## **40-2 CONTINUOUSLY REINFORCED CONCRETE PAVEMENT**

### **40-2.01 GENERAL**

#### **40-2.01A Summary**

Section 40-2 includes specifications for constructing CRCP.

Terminal joints include saw cutting, dowel bars, drill and bond dowel bars, support slab, support slab reinforcement, tack coat, and temporary hot mix asphalt.

Expansion joints include polystyrene, support slab, support slab reinforcement, dowel bars, drill and bond dowel bars, and bond breaker.

Wide flange beam terminals include polyethylene foam, support slab, and support slab reinforcement.

Pavement anchors include cross drains, anchor reinforcement, filter fabric, and permeable material.

#### **40-2.01B Definitions**

Reserved

#### **40-2.01C Submittals**

Reserved

#### **40-2.01D Quality Control and Assurance**

##### **40-2.01D(1) General**

Reserved

##### **40-2.01D(2) Testing for Coefficient of Thermal Expansion**

For field qualification, test coefficient of thermal expansion under AASHTO T 336. The coefficient of thermal expansion must not exceed 6.0 microstrain/degree Fahrenheit.

### **40-2.02 MATERIALS**

#### **40-2.02A General**

Class 1 permeable material, filter fabric, and slotted plastic pipe cross drain as shown for pavement anchors must comply with section 68-3.

#### **40-2.02B Concrete**

Concrete for terminal joints, support slabs, and pavement anchors must comply with section 40-1.02.

#### **40-2.02C Transverse Bar Assembly**

Instead of transverse bar and other support devices, you may use transverse bar assemblies to support longitudinal bar. Bar reinforcement and wire must comply with section 40-1.02C.

#### **40-2.02D Wide Flange Beam**

Wide flange beams and studs must be either rolled structural steel shapes under ASTM A 36/A 36M or structural steel under ASTM A 572/A 572M.

#### **40-2.02E Joints**

Joint seals for wide flange beam terminals must comply with section 51-2.02.

Joint seals for transverse expansion joints must comply with section 51-2.02.

Expanded polystyrene for transverse expansion joints must comply with section 51-2.01B(1).

### **40-2.03 CONSTRUCTION**

#### **40-2.03A General**

Reserved

#### **40-2.03B Test Strips**

Comply with section 40-1.03C except during the evaluation, the Engineer visually checks reinforcement, dowel and tie bar placement.

#### **40-2.03C Construction Joints**

Transverse construction joints must be perpendicular to the lane line. Construct joints to allow for lap splices of the longitudinal bar. Comply with the lap splice lengths shown for CRCP.

Clean construction joint surfaces before placing fresh concrete against the joint surfaces. Remove surface laitance, curing compound, and other foreign materials.

#### **40-2.03D Bar Reinforcement**

Place bar reinforcement under section 52-1.03D, except you may request to use plastic chairs. Plastic chairs will only be considered for support directly under the transverse bars. Your request to use plastic chairs must include a sample of the plastic chair, the manufacturer's written recommendations for the applicable use and load capacity, chair spacing, and your calculation for the load on a chair for the area of bar reinforcement sitting on it. Vertical and lateral stability of the bar reinforcement and plastic chairs must be demonstrated during construction of the test strip. Obtain authorization before using the proposed plastic chairs for work after the test strip is accepted.

For transverse bar in a curve with a radius under 2,500 feet, place the reinforcement in a single continuous straight line across the lanes and aligned with the radius point as shown.

#### **40-2.03E Wide Flange Beams**

Weld stud ends with an electric arc welder completely fusing the studs to the wide flange beam. Replace studs dislodged in shipping or that can be dislodged with a hammer.

#### **40-2.03F Repair and Replacement**

##### **40-2.03F(1) General**

Requirements for repair of cracks under section 40-1.03Q do not apply to CRCP. High molecular weight methacrylate is not to be applied to cracks in CRCP.

New CRCP will be monitored for 1 year from contract acceptance or relief from maintenance, whichever is less. CRCP that develops raveling areas of 6 inches by 6 inches or greater will require partial depth repair under section 6-3.06. CRCP that develops one or more full-depth transverse cracks with faulting greater than 0.25 inch or one or more full-depth longitudinal cracks with faulting greater 0.50 inch will require full depth repair.

##### **40-2.03F(2) Partial Depth Repair**

Partial depth repair must comply with section 41-4 except:

1. Determine a rectangular boundary which extends 6 inches beyond the damaged area. The limits of saw depth must be between 2 inches from the surface to 1/2 inch above the longitudinal bars.
2. If each length of the repair boundaries is equal to or greater than 3 ft, additional reinforcement is needed for the repair area. Submit a plan for authorization before starting the repair.

##### **40-2.03F(3) Full Depth Repair**

###### **40-2.03F(3)(a) General**

Removal of CRCP must be full depth except for portion of reinforcement to remain. Provide continuity of reinforcement. Comply with section 52-6. Submit a plan for authorization, before starting the repair. Do not damage the base, concrete and reinforcement to remain. Place concrete in the removal area.

###### **40-2.03F(3)(b) Transverse Cracks**

Make initial full-depth transverse saw cuts normal to the lane line a distance of 3 feet on each side of the transverse crack.

###### **40-2.03F(3)(c) Longitudinal Cracks**

Remove the cracked area normal to the lane line for the full width of the lane a distance of 1 foot beyond the ends of the crack. You may propose alternate limits with your repair plan for authorization.

**40-2.03G Reserved**

**40-2.04 PAYMENT**

Not Used

**40-3 RESERVED**

**40-4 JOINTED PLAIN CONCRETE PAVEMENT**

**40-4.01 GENERAL**

**40-4.01A Summary**

Section 40-4 includes specifications for constructing JPCP.

**40-4.01B Definitions**

Reserved

**40-4.01C Submittals**

**40-4.01C(1) General**

Reserved

**40-4.01C(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

**40-4.01C(3)–40-4.01C(8) Reserved**

**40-4.01D Quality Control and Assurance**

**40-4.01D(1) General**

Reserved

**40-4.01D(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.

**40-4.01D(3) Early Age Crack Mitigation System**

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

**40-4.01D(4)–40-4.01D(9) Reserved**

**40-4.02 MATERIALS**

Not Used

**40-4.03 CONSTRUCTION**

**40-4.03A General**

Transverse contraction joints on a curve must be on a single straight line through the curve's radius point. If transverse joints do not align in a curve, drill a full depth 2" diameter hole under ASTM C 42/C 42M where the joint meets the adjacent slab. Fill the hole with joint filler. If joints are not sealed, avoid joint filler material penetration into the joint.

**40-4.03B Repair and Replacement**

If replacing concrete, saw cut and remove to full depth.



#### 41-1.02B Fast-Setting Concrete

Fast-setting concrete must be one of the following:

1. Magnesium phosphate concrete that is either:
  - 1.1. Single component water activated
  - 1.2. Dual component with a prepackaged liquid activator
2. Modified high-alumina based concrete
3. Portland cement based concrete

Fast-setting concrete must be stored in a cool and dry environment.

If used, the addition of retarders must comply with the manufacturer's instructions.

You may use any accelerating chemical admixtures complying with ASTM C494/C494M, Type C and section 90-1.02E.

Fast-setting concrete properties must have the values shown in the following table:

Fast-Setting Concrete		
Property	Test method	Value
Compressive strength <sup>a</sup> (psi, min)		
at 3 hours	California Test 551	3,000
at 24 hours	California Test 551	5,000
Flexural strength <sup>a</sup> (psi, min, at 24 hours)	California Test 551	500
Bond strength <sup>a</sup> (psi, min, at 24 hours)		
Saturated surface dry concrete	California Test 551	300
Dry concrete	California Test 551	400
Water absorption (% max)	California Test 551	10
Abrasion resistance <sup>a</sup> (g, max, at 24 hours)	California Test 550	25
Drying shrinkage (% max, at 4 days)	ASTM C596	0.13
Water soluble chlorides <sup>d</sup> (% max, by weight)	California Test 422	0.05
Water soluble sulfates <sup>d</sup> (% max, by weight)	California Test 417	0.25
Thermal stability (% min)	California Test 553	90

<sup>a</sup>Perform test with aggregate filler if used.

<sup>b</sup>Test must be performed on a cube specimen, fabricated under California Test 551, cured at least 14 days, and then pulverized to 100% passing the no. 50 sieve.

Aggregate filler may be used to extend prepackaged concrete. Aggregate filler must:

1. Be clean and uniformly rounded.
2. Have a moisture content of 0.5-percent by weight or less when tested under California Test 226.
3. Comply with sections 90-1.02C(2) and 90-1.02C(3).
4. Not exceed 50 percent of the concrete volume or the maximum recommended by the fast-setting concrete manufacturer, whichever is less.

When tested under California Test 202, aggregate filler must comply with the grading in the following table:

Aggregate Filler Grading	
Sieve size	Percentage passing
3/8 inch	100
No. 4	50–100
No. 16	0–5

#### 41-1.02C Polyester Concrete

Polyester concrete consists of polyester resin binder and dry aggregate. The polyester resin binder must be an unsaturated isophthalic polyester-styrene copolymer.

Polyester resin binder properties must have the values shown in the following table:

**Polyester Resin Binder**

Property	Test method	Value
Viscosity <sup>a</sup> (Pa·s) RVT, No. 1 spindle, 20 RPM at 77 °F	ASTM D2196	0.075– 0.200
Specific gravity <sup>a</sup> (77 °F)	ASTM D1475	1.05–1.10
Elongation (%), min) Type I specimen, 0.25 ± 0.03 inch thick Speed of testing = 0.45 inch/minute Condition 18/25/50+5/70: T—23/50	ASTM D638	35
Tensile strength (psi, min) Type I specimen, 0.25 ± 0.03 inch thick Speed of testing = 0.45 inch/minute Condition 18/25/50+5/70: T—23/50	ASTM D638	2,500
Styrene content <sup>a</sup> (%), by weight)	ASTM D2369	40–50
Silane coupler (%), min, by weight of polyester resin binder)	--	1.0
PCC saturated surface-dry bond strength at 24 hours and 70 ± 2 °F (psi, min)	California Test 551	500
Static volatile emissions <sup>a</sup> (g/sq m, max)	South Coast Air Quality Management District, Method 309-91 <sup>b</sup>	60

<sup>a</sup>Perform the test before adding initiator.

<sup>b</sup>For the test method, go to:

<http://www.aqmd.gov/tao/methods/lab/309-91.pdf>

Silane coupler must be an organosilane ester, gamma-methacryloxypropyltrimethoxysilane. Promoter must be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Aggregate for polyester concrete must comply with section 90-1.02C(1), 90-1.02C(2), and 90-1.02C(3).

When tested under California Test 202, the combined aggregate grading must comply with one of the gradations in the following table:

**Combined Aggregate Grading**

Sieve size	Percentage passing		
	A	B	C
1/2"	100	100	100
3/8"	83–100	100	100
No. 4	65–82	62–85	45–80
No. 8	45–64	45–67	35–67
No. 16	27–48	29–50	25–50
No. 30	12–30	16–36	15–36
No. 50	6–17	5–20	5–20
No. 100	0–7	0–7	0–9
No. 200	0–3	0–3	0–6

Aggregate retained on the no. 8 sieve must have a maximum of 45 percent crushed particles under California Test 205. Fine aggregate must be natural sand.

The weighted average absorption must not exceed 1 percent when tested under California Tests 206 and 207.

You may submit an alternative grading or request to use manufactured sand as fine aggregate but 100 percent of the combined grading must pass the 3/8 inch sieve. Allow 21 days for authorization.

Polyester concrete must have a minimum compressive strength of 1250 psi at 3 hours and 30 minutes under California Test 551 or ASTM C109.

#### **41-1.02D Bonding Agent**

Bonding agent must comply with the concrete manufacturer's recommendations.

#### **41-1.02E Temporary Pavement Structure**

Temporary pavement structure consists of RSC or aggregate base with HMA. RSC not conforming to the specifications may serve as temporary pavement structure if:

1. The modulus of rupture is at least 200 psi before opening to traffic
2. RSC thickness is greater than or equal to the existing concrete pavement surface layer
3. RSC is replaced during the next paving shift

Aggregate base for temporary pavement structure must comply with the 3/4-inch maximum grading specified in section 26-1.02B.

HMA must comply with section 39-1.15 except do not use HMA Type B.

#### **41-1.02F Reserved**

### **41-1.03 CONSTRUCTION**

#### **41-1.03A General**

Repair only the portion of pavement where the work will be completed during the same lane closure. If removal is required, remove only the portion of pavement where the repair will be completed during the same traffic closure. Completion of concrete repair includes curing until the concrete attains the specified minimum properties required before opening the repaired pavement to traffic.

If you fail to complete the concrete pavement repair during the same lane closure, construct temporary pavement before opening the lane to traffic.

Before starting repair work, except saw cutting: the equipment, materials, and personnel for constructing temporary pavement structure must be at the job site or an approved location. If HMA can be delivered to the job site within 1 hour, you may request 1-hour delivery as an alternative to having the HMA at the job site.

Maintain the temporary pavement structure and replace it as a first order of work as soon as you resume concrete pavement repair work.

After removing temporary pavement structure, you may stockpile that aggregate base at the job site and reuse it for temporary pavement structure.

#### **41-1.03B Mixing and Applying Bonding Agent**

Mix and apply the bonding agent at the job site under the manufacturer's instructions and in small quantities.

Apply bonding agent after cleaning the surface and before placing concrete.

Apply a thin, even coat of bonding agent with a stiff bristle brush until the entire repair surface is scrubbed and coated with bonding agent.

#### **41-1.03C Mixing Concrete**

##### **41-1.03C(1) General**

Mix concrete in compliance with the manufacturer's instructions. For repairing spalls, mix in a small mobile drum or paddle mixer. Comply with the manufacturer's recommended limits for the quantity of aggregate filler, water, and liquid activator.

Mix the entire contents of prepackaged dual-component magnesium phosphate concrete as supplied by the manufacturer. Use the full amount of each component and do not add water to dual-component magnesium phosphate concrete.

Magnesium phosphate concrete must not be mixed in containers or worked with tools containing zinc, cadmium, aluminum, or copper.

Modified high-alumina based concrete must not be mixed in containers or worked with tools containing aluminum.

#### **41-1.03C(2) Polyester Concrete**

When mixing with resin, the moisture content of the combined aggregate must not exceed 1/2 of the average aggregate absorption when tested under California Test 226.

Proportion the polyester resin and aggregate to produce a mixture with suitable workability for the intended work. Only a minimal amount of resin may rise to the surface after finishing.

#### **41-1.03D Placing Concrete**

The pavement surface temperature must be at least 40 degrees F before placing concrete. You may propose methods to heat the surfaces.

Place magnesium phosphate concrete on a dry surface.

Place portland cement and modified high-alumina concrete on surfaces treated with a bonding agent recommended by the concrete manufacturer. If no bonding agent is recommended by the manufacturer, place concrete on damp surfaces that are not saturated.

Do not retemper concrete. Use dry finishing tools cleaned with water before working the concrete.

#### **41-1.03E Curing Concrete**

Cure concrete under the manufacturer's instructions. When curing compound is used, comply with section 90-1.03B for curing compound no. 1 or 2.

#### **41-1.03F Reserved**

#### **41-1.04 PAYMENT**

Not Used

### **41-2 SUBSEALING AND JACKING**

#### **41-2.01 GENERAL**

##### **41-2.01A Summary**

Section 41-2 includes specifications for filling voids under existing concrete pavement.

##### **41-2.01B Definitions**

Reserved

##### **41-2.01C Submittals**

Submit shipping invoices with packaged or bulk fly ash and cement.

Before grouting activities begin, submit a proposal for the materials to be used. Include authorized laboratory test data for the grout indicating:

1. Time of initial setting under ASTM C266.
2. Compressive strength results at 1, 3, and 7 days for 10, 12, and 14-second grout efflux times.

If requesting a substitution of grout materials, submit a proposal that includes test data.

##### **41-2.01D Quality Control and Assurance**

Reserved

#### **41-2.02 MATERIALS**

##### **41-2.02A General**

Reserved

#### **41-2.02B Grout**

Grout must consist of Type II portland cement, fly ash, and water. Use from 2.4 to 2.7 parts fly ash to 1 part portland cement by weight. Use enough water to produce the following grout efflux times determined under California Test 541, Part D:

1. From 10 to 16 seconds for subsealing
2. From 10 to 26 seconds for jacking

Cement for grout must comply with the specifications for Type II portland cement in section 90-1.02B(2).

Fly ash must comply with AASHTO M 295, Class C or Class F. Fly ash sources must be on the Authorized Material List.

You may use chemical admixtures and calcium chloride. Chemical admixtures must comply with section 90-1.02E(2). Calcium chloride must comply with ASTM D98.

Test grout compressive strength under California Test 551, Part 1 at 7-days with 12 seconds efflux time. Follow the procedures for moist cure. The 7-day compressive strength must be at least 750 psi.

#### **41-2.02C Mortar**

Mortar must be a prepackaged fast-setting mortar that complies with ASTM C928.

#### **41-2.02D Reserved**

### **41-2.03 CONSTRUCTION**

#### **41-2.03A General**

Drill holes in the pavement, inject grout, plug the holes, and finish the holes with mortar.

Drill holes through the pavement and underlying base to a depth from 15 to 18 inches below the pavement surface. The hole diameter must match the fitting for the grout injecting equipment.

#### **41-2.03B Injecting Grout**

##### **41-2.03B(1) General**

Inject grout within 2 days of drilling holes.

Immediately before injecting grout, clean the drilled holes with water at a minimum pressure of 40 psi. The cleaning device must have at least 4 jets that direct water horizontally at the slab-base interface.

Do not inject grout if the atmospheric or subgrade temperature is below 40 degrees F. Do not inject grout in inclement weather. If water is present in the holes, obtain the Engineer's authorization before injecting grout.

Do not inject grout until at least 2 consecutive slabs requiring subsealing are drilled ahead of the grouting activities.

The grout plant must have a positive displacement cement injection pump and a high-speed colloidal mixer capable of operating from 800 to 2,000 rpm. The injection pump must sustain 150 psi if pumping grout with a 12-second efflux time. A pressure gauge must be located immediately adjacent to the supply valve of the grout hose supply valve and positioned for easy monitoring.

Before mixing, weigh dry cement and fly ash if delivered in bulk. If the materials are packaged, each container must weigh the same.

Introduce water to the mixer through a meter or scale.

Inject grout under pressure until the voids under the pavement slab are filled. The injection nozzle must not leak. Do not inject grout if the nozzle is below the bottom of the slab. Inject grout 1 hole at a time.

Stop injecting grout in a hole if either:

1. Grout does not flow under a sustained pump gauge pressure of 150 psi after 7 seconds and there is no indication the slab is moving.
2. Injected grout rises to the surface at any joint or crack, or flows into an adjacent hole.

Dispose of unused grout within 1 hour of mixing.

#### **41-2.03B(2) Subsealing**

If a slab raises more than 1/16 inch due to grout injection, stop injecting grout in that hole.

#### **41-2.03B(3) Jacking**

The positive displacement pump used for grout injection must be able to provide a sustained gauge pressure of 200 psi. Gauge pressures may be from 200 to 600 psi for brief periods to start slab movement.

You may add additional water to initiate pressure injection of grout. Do not reduce the grout efflux time below 10 seconds.

Raise the slabs uniformly. Use string lines to monitor the pavement movement.

Do not move adjacent slabs not specified for pavement jacking. If you move adjacent slabs, correct the grade within the tolerances for final pavement elevation.

#### **41-2.03B(4) Finishing**

Immediately after removing the injection nozzle, plug the hole with a round, tapered wooden plug. Do not remove plugs until adjacent holes are injected with grout and no grout surfaces through previously injected holes.

After grouting, remove grout from drilled holes at least 4 inches below the pavement surface. Clean holes and fill with mortar. Finish filled holes flush with the pavement surface.

#### **41-2.03B(5) Tolerances**

The final pavement elevation must be within 0.01 foot of the required grade. If the final pavement elevation is between 0.01 and 0.10 foot higher than the required grade, grind the noncompliant pavement surface under section 42 to within 0.01 foot of the required grade.

If the final pavement elevation is higher than 0.10 foot from the required grade, remove and replace the noncompliant pavement under section 41-9.

#### **41-2.04 PAYMENT**

The payment quantity for subsealing is calculated by adding the dry weight of cement and fly ash used for the placed grout. The payment quantity for jacking is calculated by adding the dry weight of cement and fly ash used for the placed grout.

The Department does not pay for wasted grout.

The Department does not adjust the unit price for an increase or decrease in the subsealing quantity.

The Department does not adjust the unit price for an increase or decrease in the jacking quantity.

### **41-3 CRACK TREATMENT**

#### **41-3.01 GENERAL**

##### **41-3.01A Summary**

Section 41-3 includes specifications for applying high-molecular-weight methacrylate (HMWM) to concrete pavement surface cracks that do not extend the full slab depth.

##### **41-3.01B Definitions**

Reserved

##### **41-3.01C Submittals**

###### **41-3.01C(1) General**

Submit HMWM samples 20 days before use.

If sealant is to be removed, submit the proposed removal method at least 7 days before sealant removal. Do not remove sealant until the proposed sealant removal method is authorized.

#### **41-3.01C(2) Public Safety and Placement Plans**

Before starting crack treatment, submit a public safety plan for HMWM and a placement plan for construction activity as shop drawings.

The public safety and placement plans must identify the materials, equipment, and methods to be used.

In the public safety plan, include the MSDS for each component of HMWM and details for:

1. Shipping
2. Storage
3. Handling
4. Disposal of residual HMWM and containers

If the project is in an urban area adjacent to a school or residence, the public safety plan must also include an airborne emissions monitoring plan prepared by a CIH certified in comprehensive practice by the American Board of Industrial Hygiene. Submit a copy of the CIH's certification. The CIH must monitor the emissions at a minimum of 4 points including the mixing point, the application point, and the point of nearest public contact. At work completion, submit a report by the industrial hygienist with results of the airborne emissions monitoring plan.

The placement plan must include:

1. Crack treatment schedule including coefficient of friction testing
2. Methods and materials including:
  - 2.1. Description of equipment for applying HMWM
  - 2.2. Description of equipment for applying sand
  - 2.3. Gel time range and final cure time for resin

Revise rejected plans and resubmit. With each plan rejection, the Engineer gives revision directions including detailed comments in writing. The Engineer notifies you of a plan's acceptance or rejection within 2 weeks of receiving that plan.

#### **41-3.01C(3) Reserved**

#### **41-3.01D Quality Control and Assurance**

##### **41-3.01D(1) General**

Use test tiles to evaluate the HMWM cure time. Coat at least one 4 by 4 inch smooth glazed tile for each batch of HMWM. Place the coated tile adjacent to the area being treated. Do not apply sand to the test tiles.

Use the same type of crack treatment equipment for testing and production.

##### **41-3.01D(2) Test Area**

Before starting crack treatment, treat a test area of at least 500 square feet within the project limits at a location accepted by the Engineer. Use test areas outside the traveled way if available.

Treat the test area under weather and pavement conditions similar to those expected during crack treatment production.

The Engineer evaluates the test area based on the acceptance criteria. Do not begin crack treatment until the Engineer accepts the test area.

##### **41-3.01D(3) Reserved**

##### **41-3.01D(4) Acceptance Criteria**

The Engineer accepts a treated area if:

1. Corresponding test tiles are dry to the touch
2. Treated surface is tack-free and not oily
3. Sand cover adheres enough to resist hand brushing
4. Excess sand is removed
5. Coefficient of friction is at least 0.30 when tested under California Test 342

### 41-3.02 MATERIALS

HMWM consists of compatible resin, promoter, and initiator. HMWM resin may be prepromoted by mixing promoter and resin together before filling containers. Identify prepromoted resin on the container label.

Adjust the gel time to compensate for temperature changes throughout the application.

HMWM resin properties must have the following values:

Property	Test method	Value
Viscosity <sup>a</sup> (cP, max, Brookfield RVT with UL adapter, 50 RPM at 77 °F)	ASTM D2196	25
Specific gravity <sup>a</sup> (min, at 77 °F)	ASTM D1475	0.90
Flash point <sup>a</sup> (°F, min)	ASTM D3278	180
Vapor pressure <sup>a</sup> (mm Hg, max, at 77 °F)	ASTM D323	1.0
Tack-free time (minutes, max, at 77 °F)	Specimen prepared under California Test 551	400
Volatile content <sup>a</sup> (% , max)	ASTM D2369	30
PCC saturated surface-dry bond strength (psi, min, at 24 hours and 77 ± 2 °F)	California Test 551	500

<sup>a</sup>Perform the test before adding initiator.

Sand must be commercial quality dry blast sand. At least 95 percent of the sand must pass the no. 8 sieve and at least 95 percent must be retained on the no. 20 sieve when tested under California Test 202.

### 41-3.02D Reserved

### 41-3.03 CONSTRUCTION

#### 41-3.03A General

Before applying HMWM, clean the pavement surface by abrasive blasting and blow loose material from visible cracks with high-pressure air. Remove concrete curing seals from the pavement to be treated. The pavement must be dry when blast cleaning is performed. If the pavement surface becomes contaminated before applying the HMWM, clean the pavement surface by abrasive blasting.

If performing abrasive blasting within 10 feet of a lane occupied by traffic, operate abrasive blasting equipment with a concurrently operating vacuum attachment.

During pavement treatment, protect pavement joints, working cracks, and surfaces not being treated.

The equipment applying HMWM must combine the components by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars must not cause atomization. Do not use compressed air to produce the spray. Use a shroud to enclose the spray bar apparatus.

You may apply HMWM manually to prevent overspray onto adjacent traffic. If applying resin manually, limit the batch quantity of HMWM to 5 gallons.

Apply HMWM at a rate of 90 square feet per gallon. The prepared area must be dry and the surface temperature must be from 50 to 100 degrees F while applying HMWM. Do not apply HMWM if the ambient relative humidity is more than 90 percent.

Protect existing facilities from HMWM. Repair or replace existing facilities contaminated with HMWM at your expense.

Flood the treatment area with HMWM to penetrate the pavement and cracks. Apply HMWM within 5 minutes after complete mixing. Mixed HMWM viscosity must not increase. Redistribute excess material with squeegees or brooms within 10 minutes of application. Remove excess material from tined grooves.

Wait at least 20 minutes after applying HMWM before applying sand. Apply sand at a rate of approximately 2 pounds per square yard or until refusal. Remove excess sand by vacuuming or sweeping.

Do not allow traffic on the treated surface until:

1. Treated surface is tack-free and non-oily
2. Sand cover adheres enough to resist hand brushing
3. Excess sand is removed
4. Coefficient of friction is at least 0.30 determined under California Test 342

#### **41-3.04 PAYMENT**

Not Used

### **41-4 SPALL REPAIR**

#### **41-4.01 GENERAL**

Section 41-4 includes specifications for repairing spalls in concrete pavement.

#### **41-4.02 MATERIALS**

Repair spalls using polyester concrete with a bonding agent. The bonding agent must comply with the requirements for HMWM in section 41-3.02 except tack-free time requirements do not apply and the HMWM must not contain wax.

Form board must be corrugated cardboard with a 6-mil polyethylene covering.

#### **41-4.03 CONSTRUCTION**

##### **41-4.03A General**

Prepare spall areas by removing concrete and cleaning. Use a form board to provide compression relief at joints and cracks.

After completing spall repairs do not allow traffic on the repairs for at least 2 hours after the time of final setting under ASTM C403/403M.

##### **41-4.03B Remove Pavement**

The Engineer determines the rectangular limits of unsound concrete pavement. Before removing pavement, mark the saw cut lines and spall repair area on the pavement surface.

Do not remove pavement until the Engineer verbally authorizes the saw cut area.

Use a power-driven saw with a diamond blade.

Remove pavement as shown and:

1. From the center of the repair area towards the saw cut
2. To the full saw cut depth
3. At least 2 inches beyond the saw cut edge to produce a rough angled surface

Produce a rough surface by chipping or other removal methods that do not damage the pavement remaining in-place. Completely remove any saw overcuts. Pneumatic hammers used for concrete removal must weigh 15 lbs or less.

If you damage concrete pavement outside the removal area, enlarge the area to remove the damaged pavement.

If dowel bars are exposed during removal, remove concrete from the exposed surface and cover with duct tape.

##### **41-4.03C Cleaning**

After pavement has been removed, clean the exposed faces of the concrete by:

1. Sand or water blasting. Water blasting equipment must be capable of producing a blast pressure of 3,000 to 6,000 psi.

2. Blowing the exposed concrete area with compressed air free of moisture and oil to remove debris after blasting. Air compressors must deliver air at a minimum of 120 cfm and develop 90 psi of nozzle pressure.

#### **41-4.03D Form Board Installation**

After cleaning, place the form board to match the existing joint or crack alignment. Extend the form board at least 3 inches beyond each end of the repair and at least 1 inch deeper than the repair. Remove the form board before sealing joints or cracks.

#### **41-4.03E–41-4.03I Reserved**

#### **41-4.04 PAYMENT**

Payment is calculated based on the authorized saw cut area.

The Department does not adjust the unit price for an increase or decrease in the spall repair quantity.

### **41-5 JOINT SEALS**

#### **41-5.01 GENERAL**

##### **41-5.01A Summary**

Section 41-5 includes specifications for sealing concrete pavement joints or replacing existing concrete pavement joint seals. Pavement joints include isolation joints.

##### **41-5.01B Definitions**

Reserved

##### **41-5.01C Submittals**

At least 15 days before delivery to the job site, submit a certificate of compliance, MSDS, manufacturer's recommendations, and instructions for storage and installation of:

1. Liquid joint sealant.
2. Backer rods. Include the manufacturer data sheet verifying compatibility with the liquid joint sealant.
3. Preformed compression joint seal. Include the manufacturer data sheet used to verify the seal for the joint dimensions shown.
4. Lubricant adhesive.

Asphalt rubber joint sealant containers must comply with ASTM D6690. Upon delivery of asphalt rubber joint sealant to the job site, submit a certified test report for each lot based on testing performed within 12 months.

Submit a work plan for removing pavement and joint materials. Allow 10 days for authorization. Include descriptions of the equipment and methods for removal of existing pavement and joint material.

##### **41-5.01D Quality Control and Assurance**

###### **41-5.01D(1) General**

Before sealing joints, arrange for a representative from the manufacturer to provide training on cleaning and preparing the joint and installing the liquid joint sealant or preformed compression joint seal. Do not seal joints until your personnel and the Department's personnel have been trained.

The Engineer accepts joint seals based on constructed dimensions and visual inspection of completed seals for voids.

###### **41-5.01D(2) Reserved**

#### **41-5.02 MATERIALS**

##### **41-5.02A General**

Use the type of seal material described.

Silicone or asphalt rubber joint sealant must not bond or react with the backer rod.

##### **41-5.02B Silicone Joint Sealant**

Silicone joint sealant must be on the Authorized Material List.

#### **41-5.02C Asphalt Rubber Joint Sealant**

Asphalt rubber joint sealant must:

1. Be paving asphalt mixed with not less than 10 percent ground rubber by weight. Ground rubber must be vulcanized or a combination of vulcanized and devulcanized materials that pass a no. 8 sieve.
2. Comply with ASTM D6690 for Type II.
3. Be capable of melting at a temperature below 400 degrees F and applied to cracks and joints.

#### **41-5.02D Backer Rods**

Backer rods must:

1. Comply with ASTM D5249:
  - 1.1. Type 1 for asphalt rubber joint sealant
  - 1.2. Type 1 or Type 3 for silicone joint sealant
2. Be expanded, closed-cell polyethylene foam
3. Have a diameter at least 25 percent greater than the saw cut joint width

#### **41-5.02E Preformed Compression Joint Seals**

Preformed compression joint seals must:

1. Comply with ASTM D2628
2. Have 5 or 6 cells, except seals 1/2 inch wide or less may have 4 cells

Lubricant adhesive used to install seals must comply with ASTM D2835.

#### **41-5.02F–41-5.02K Reserved**

### **41-5.03 CONSTRUCTION**

#### **41-5.03A General**

If joint sealing is described for new concrete pavement, do not start joint sealing activities until the pavement has been in place for at least 7 days. Seal new concrete pavement joints at least 7 days after concrete pavement placement if shown.

Remove existing pavement and joint material by sawing, rectangular plowing, cutting, or manual labor. Saw cut the reservoir before cleaning the joint. Use a power-driven saw with a diamond blade.

If you damage a portion of the pavement to remain in place, repair the pavement under section 41-4.

#### **41-5.03B Joint Cleaning**

##### **41-5.03B(1) General**

Clean the joint after removal and any repair is complete before installing joint seal material. Cleaning must be completed no more than 4 hours before installing backer rods, liquid joint seal, or preformed compression seals using the following sequence:

1. Removing debris
2. Drying
3. Sandblasting
4. Air blasting
5. Vacuuming

Clean in 1 direction to minimize contamination of surrounding areas.

##### **41-5.03B(2) Removing Debris**

Remove debris including dust, dirt, and visible traces of old sealant from the joint after sawing, plowing, cutting, or manual removal. Do not use chemical solvents to wash the joint.

##### **41-5.03B(3) Drying**

After removing debris, allow the reservoir surfaces to dry or remove moisture and dampness at the joint with compressed air that may be moderately hot.

#### **41-5.03B(4) Sandblasting**

After the joint is dry, sandblast the reservoir to remove remaining residue using a 1/4-inch diameter nozzle and 90 psi minimum pressure. Do not sandblast straight into the reservoir. Angle the sandblasting nozzle within 1 to 2 inches from the concrete and make at least 1 pass to clean each reservoir face.

#### **41-5.03B(5) Air Blasting**

After sandblasting, air blast the reservoir to remove sand, dirt, and dust 1 hour before sealing the joint. Use compressed air free of oil and moisture delivered at a minimum rate of 120 cfm and 90 psi nozzle pressure.

#### **41-5.03B(6) Vacuuming**

After air blasting, use a vacuum sweeper to remove debris and contaminants from the pavement surfaces surrounding the joint.

#### **41-5.03B(7) Reserved**

#### **41-5.03C Installing Liquid Joint Sealant**

Where backer rods are shown, place the rods before installing liquid joint sealant. Place backer rods under the manufacturer's instructions unless otherwise specified. The pavement and reservoir surfaces must be dry and the ambient air temperature must be at least 40 degrees F and above the dew point. The reservoir surface must be free of residue or film. Do not puncture the backer rod.

Immediately after placing the backer rod, install liquid joint sealant under the manufacturer's instructions unless otherwise specified. Before installing, demonstrate that fresh liquid sealant is ejected from the nozzle free of cooled or cured material. For asphalt rubber joint sealant, the pavement surface temperature must be at least 50 degrees F before installing.

Pump liquid joint sealant through a nozzle sized for the width of the reservoir so that liquid joint sealant is placed directly onto the backer rod. The installer must draw the nozzle toward his body and extrude liquid joint sealant evenly. Liquid joint sealant must maintain continuous contact with the reservoir walls during extrusion.

After placing liquid joint sealant, recess it to the depth shown within 10 minutes of installation and before a skin begins to form.

After each joint is sealed, remove excess liquid joint sealant on the pavement surface. Do not allow traffic over the sealed joints until the liquid joint sealant is set, tack free, and firm enough to prevent embedment of roadway debris.

#### **41-5.03D Installing Preformed Compression Joint Seals**

Install preformed compression joint seals using lubricant adhesive as shown and under the manufacturer's instructions.

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 widening 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, comply with the manufacturer's instructions.

Use a machine specifically designed for preformed compression joint seal installation. The machine must install the seal:

1. To the specified depth
2. To make continuous contact with the joint walls
3. Without cutting, nicking, or twisting the seal
4. Without stretching the seal more than 4 percent

Cut preformed compression joint seal material to the exact length of the pavement joint to be sealed. The Engineer measures this length. After you install the preformed compression joint seal, the Engineer

measures the excess length of material at the joint end. The Engineer divides the excess length by the measured cut length to determine the stretch percentage.

Seals must be compressed from 30 to 50 percent of the joint width when complete in place.

#### **41-5.03E Reserved**

#### **41-5.04 PAYMENT**

Not Used

### **41-6 CRACK AND SEAT**

#### **41-6.01 GENERAL**

##### **41-6.01A Summary**

Section 41-6 includes specifications for cracking, seating, and preparing the surface of existing concrete pavement.

##### **41-6.01B Definitions**

Reserved

##### **41-6.01C Submittals**

Submit each core in a plastic bag or tube for acceptance at the time of sampling. Mark each core with a location description.

##### **41-6.01D Quality Control and Assurance**

###### **41-6.01D(1) General**

If cracking is noncompliant:

1. Stop crack and seat work
2. Modify your equipment and procedures and crack the noncompliant pavement again
3. Construct another test section
4. Take additional core samples to verify compliance
5. Construct an inspection strip if the concrete pavement has HMA on the surface

###### **41-6.01D(2) Test Section**

The Engineer determines and marks a test section up to 1000 square feet within the crack and seat area shown. Construct the test section and obtain the Engineer's verbal authorization before starting crack and seat work.

Immediately before cracking the test section, apply water to the pavement surface so that cracking can be readily evaluated. Crack the test section and vary impact energy and striking patterns to verify your procedure.

###### **41-6.01D(3) Coring**

Drill cores at least 6 inches in diameter under ASTM C42 to verify cracking in the Engineer's presence. Take at least 2 cores per test section and 1 core per lane mile for each pavement cracking machine used. The Engineer determines the core locations.

###### **41-6.01D(4) Reserved**

#### **41-6.02 MATERIALS**

##### **41-6.02A General**

Use fast-setting or polyester concrete to fill core holes.

#### **41-6.03 CONSTRUCTION**

##### **41-6.03A Cracking**

Crack existing concrete pavement using the procedures and equipment from the authorized test section.

Do not allow flying debris during cracking operations.

Crack existing concrete pavement into segments that nominally measure 6 feet transversely by 4 feet longitudinally. If the existing pavement is already cracked into segments, crack it into equal-sized square

or rectangular pieces that nominally measure not more than 6 feet transversely and from 3 to 5 feet longitudinally. Do not impact the pavement within 1 foot of another break line, pavement joint, or edge of pavement.

Cracks must be vertical, continuous, and penetrate the full depth of pavement. Cracks must be within 6 inches of vertical along the full depth of pavement. Do not cause surface spalling over 0.10-foot deep or excessive shattering of the pavement or base.

Cracking equipment must impact the pavement with a variable force in a controlled location. Do not use unguided free-falling weights such as "headache balls."

If the concrete pavement has no more than 0.10 foot of asphalt concrete on the surface, you may crack the pavement without removing the asphalt concrete. After cracking, construct an inspection strip by removing at least 500 square feet of asphalt concrete at a location determined by the Engineer. Construct additional inspection strips to demonstrate compliance where ordered by the Engineer.

After cracking, allow public traffic on the cracked or initial pavement layer for no more than 15 days.

#### **41-6.03B Seating**

Seat cracked concrete by making at least 5 passes over the cracked concrete with either:

1. Oscillating pneumatic-tired roller under section 39-3.03 and at least 15 tons
2. Vibratory pad-foot roller exerting a dynamic centrifugal force of at least 10 tons

A pass is 1 movement of a roller in either direction at 5 mph or less.

After all segments have been seated, clean loose debris from joints and cracks using compressed air free of moisture and oil.

Reseat any segment of cracked pavement that has not been overlaid within 24 hours of seating.

#### **41-6.03C Surface Preparation**

Before opening cracked and seated pavement to traffic or overlaying:

1. Fill joints, cracks, and spalls wider than 3/4 inch and deeper than 1 inch by applying tack coat and placing HMA under section 39-1.15, except use the no. 4 gradation instead of 3/8-inch.
2. Remove all loose debris and sweep the pavement.

#### **41-6.03D Reserved**

#### **41-6.04 PAYMENT**

Crack and seat existing concrete pavement is measured from the area of pavement cracked and seated. No deduction is made for existing cracked segments. The Department does not pay for HMA used to fill joints, cracks, and spalls.

### **41-7 TRANSITION TAPER**

#### **41-7.01 GENERAL**

Section 41-7 includes specifications for constructing transition tapers in existing pavement.

#### **41-7.02 MATERIALS**

Not Used

#### **41-7.03 CONSTRUCTION**

Construct transition tapers by either grinding or removing and replacing the existing concrete. Do not allow flying debris during the construction of tapers.

Grinding must comply with section 42.

Replacement concrete must comply with section 41-9 except place concrete to the taper level shown and finish the surface with a coarse broom.

If the transition taper will be overlaid with HMA that is not placed before opening to traffic and there is a grade difference of more than 0.04 foot, construct a temporary taper by placing HMA that complies with section 39-1.15. Remove the temporary HMA taper before constructing the transition taper.

#### **41-7.04 PAYMENT**

Pavement transition tapers are measured using the dimensions shown. The Department does not pay for temporary HMA tapers.

### **41-8 DOWEL BAR RETROFIT**

Reserved

### **41-9 INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE**

#### **41-9.01 GENERAL**

##### **41-9.01A Summary**

Section 41-9 includes specifications for removing existing concrete pavement and constructing individual slab replacement with rapid strength concrete (ISR—RSC).

##### **41-9.01B Definitions**

**concrete raveling:** Disintegration of the concrete surface layer from aggregate loss.

**early age:** Any age less than 10 times the time of final setting for concrete determined under ASTM C403/C403M.

**full-depth crack:** Crack that runs from one edge of the concrete slab to the opposite or adjacent side of the slab.

**opening age:** Age when the minimum modulus of rupture specified for opening to traffic and equipment is attained.

**time of final setting:** Elapsed time required to develop a concrete penetration resistance that is at least 4,000 psi under ASTM C403/C403M.

##### **41-9.01C Submittals**

###### **41-9.01C(1) General**

At least 15 days before delivery to the job site, submit manufacturer's recommendations, MSDS and instructions for storage and installation of joint filler material.

At least 45 days before starting ISR—RSC work submit a sample of cement from each proposed lot and samples of proposed admixtures in the quantities ordered by the Engineer.

During ISR—RSC placement operations, submit uniformity reports for hydraulic cement at least once every 30 days to the Engineer and METS, attention Cement Laboratory. Uniformity reports must comply with ASTM C917 except testing age and water content may be modified to suit the particular material.

Except for modulus of rupture tests, submit QC test result forms within 48 hours of the paving shift. Submit modulus of rupture results within:

1. 15 minutes of opening age test completion
2. 24 hours of 3-day test completion

###### **41-9.01C(2) Quality Control Plan**

If the quantity of ISR—RSC is at least 300 cu yd, submit a QC plan at least 20 days before placing trial slabs. If the quantity of ISR—RSC is less than 300 cu yd, submit proposed forms for RSC inspection, sampling, and testing.

###### **41-9.01C(3) Mix Design**

At least 10 days before use in a trial slab, submit a mix design. The maximum ambient temperature range for a mix design is 18 degrees F. Submit more than 1 mix design based on ambient temperature variations anticipated during RSC placement. Each mix design must include:

1. Mix design identification number

2. Aggregate source
3. Opening age
4. Aggregate gradation
5. Types of cement and chemical admixtures
6. Mix proportions
7. Maximum time allowed between batching and placing
8. Range of effective ambient temperatures
9. Time of final setting
10. Modulus of rupture development data from laboratory-prepared samples, including tests at:
  - 10.1. 1 hour before opening age
  - 10.2. Opening age
  - 10.3. 1 hour after opening age
  - 10.4. 1 day
  - 10.5. 3 days
  - 10.6. 7 days
  - 10.7. 28 days
11. Shrinkage test data
12. Any special instructions or conditions such as water temperature requirements

**41-9.01C(4) Reserved**

**41-9.01D Quality Control and Assurance**

**41-9.01D(1) General**

Designate a QC manager and assistant QC managers to administer the QC plan. The QC managers must hold current American Concrete Institute (ACI) certification as a Concrete Field Testing Technician-Grade I and a Concrete Laboratory Testing Technician-Grade II, except the assistant QC managers may hold Concrete Laboratory Testing Technician-Grade I instead of Grade II.

The QC manager responsible for the production period involved must review and sign the sampling, inspection, and test reports before submitting them. The QC manager must be present for:

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

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

Testing laboratories and equipment must comply with the Department's Independent Assurance Program. At the time of the QC plan submittal, the Department evaluates the quality control samplers and testers.

**41-9.01D(2) Just-in-time Training**

Reserved

**41-9.01D(3) Quality Control Plan**

Establish, implement, and maintain a QC plan for pavement. The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include:

1. Names, qualifications, and certifications of QC personnel, including:
  - 1.1. QC manager
  - 1.2. Assistant QC managers
  - 1.3. Samplers and testers
2. Outline of procedure for the production, transportation, placement, and finishing of RSC

3. Outline of procedure and forms for concrete QC, sampling, and testing to be performed during and after RSC construction, including testing frequencies for modulus of rupture
4. Contingency plan for identifying and correcting problems in production, transportation, placement, or finishing RSC including:
  - 4.1. Action limits
  - 4.2. Suspension limits that do not exceed specified material requirements
  - 4.3. Detailed corrective action if limits are exceeded
  - 4.4. Temporary pavement structure provisions, including:
    - 4.4.1. The quantity and location of standby material
    - 4.4.2. Determination of need
5. Location of your quality control testing laboratory and testing equipment during and after paving operations
6. List of the testing equipment to be used, including the date of last calibration
7. Production target values for material properties that impact concrete quality or strength including cleanness value and sand equivalent
8. Outline procedure for placing and testing trial slabs, including:
  - 8.1. Locations and times
  - 8.2. Production procedures
  - 8.3. Placing and finishing methods
  - 8.4. Sampling methods, sample curing, and sample transportation
  - 8.5. Testing and test result reporting
9. Name of source plant with approved Material Plant Quality Program (MPQP)
10. Procedures or methods for controlling pavement quality including:
  - 10.1. Materials quality
  - 10.2. Contraction and construction joints
  - 10.3. Protecting pavement before opening to traffic

#### **41-9.01D(4) Prepaving Conference**

Schedule a prepaving conference and provide a facility to meet with the Engineer.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. Project manager
3. QC manager
4. Workers and your subcontractor's workers, including:
  - 4.1. Foremen
  - 4.2. Concrete plant manager
  - 4.3. Concrete plant operator
  - 4.4. Concrete plant inspectors
  - 4.5. Personnel performing saw cutting and joint sealing
  - 4.6. Paving machine operators
  - 4.7. Inspectors
  - 4.8. Samplers
  - 4.9. Testers

The purpose of the prepaving conference is to familiarize personnel with the project's specifications. Discuss the QC plan and processes for constructing each item of work, including:

1. Production
2. Transportation
3. Trial slabs
4. Pavement structure removal
5. Placement
6. Contingency plan
7. Sampling
8. Testing
9. Acceptance

Do not start trial slabs or paving activities until the listed personnel have attended the prepaving conference.

#### **41-9.01D(5) Trial Slabs**

Before starting individual slab replacement work, complete 1 trial slab for each mix design.

Place trial slabs near the job site at a mutually-agreed location that is neither on the roadway nor within the project limits. Trial slabs must be 10 by 20 feet and at least 10 inches thick.

During trial slab construction, sample and split the aggregate for grading, cleanness value, and sand equivalent testing.

Fabricate and test beams under California Test 524 to determine the modulus of rupture values.

Cure beams fabricated for early age testing such that the monitored temperatures in the beams and the slab are always within 5 degrees F of each other.

Monitor and record the internal temperatures of trial slabs 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 3-day testing under California Test 524 except place them into sand at a time that is from 5 to 10 times the time of final setting measured under ASTM C403/403M or 24 hours, whichever is earlier.

Trial slabs must have an opening age modulus of rupture of not less than 400 psi and a 3-day modulus of rupture of not less than 600 psi.

After authorization, remove and dispose of trial slabs and testing materials.

#### **41-9.01D(6) Quality Control Testing**

##### **41-9.01D(6)(a) General**

Provide continuous process control and quality control sampling and testing throughout RSC production and placement. Notify the Engineer at least 2 business days notice before any sampling and testing. Establish a testing facility at the job site or at an authorized location.

Sample under California Test 125.

During ISR—RSC placement, sample and fabricate beams for modulus of rupture testing within the first 30 cubic yards, at least once every 130 cu yd, and within the final truckload. Submit split samples and fabricate test beams for the Department's testing unless the Engineer informs you otherwise.

Determine the modulus of rupture at opening age under California Test 524, except beam specimens may be fabricated using an internal vibrator under ASTM C 31. Cure beams under the same conditions as the pavement until 1 hour before testing. Test 3 beam specimens in the presence of the Engineer and average the results. A single test represents no more than that day's production or 130 cu yd, whichever is less.

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 time of final setting under ASTM C403/C403M or 24 hours, whichever is earlier.

##### **41-9.01D(6)(b) Rapid Strength Concrete**

Your quality control must include testing RSC for the properties at the frequencies shown in the following table:

### RSC Minimum Quality Control

Property	Test method	Minimum testing frequency <sup>a</sup>
Cleanness value	California Test 227	650 cu yd or 1 per shift
Sand equivalent	California Test 217	650 cu yd or 1 per shift
Aggregate gradation	California Test 202	650 cu yd or 1 per shift
Air content	California Test 504	130 cu yd or 2 per shift
Yield	California Test 518	2 per shift
Slump or penetration	ASTM C143 or California Test 533	1 per 2 hours of paving
Unit weight	California Test 518	650 cubic yards or 2 per shift
Aggregate Moisture Meter Calibration <sup>b</sup>	California Test 223 or California Test 226	1 per shift
Modulus of rupture	California Test 524	Comply with section 41-9.01D(6)(a)

<sup>a</sup>Test at the most frequent interval.

<sup>b</sup>Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results

Maintain control charts to identify potential problems and causes. Post a copy of each control chart at a location determined by the Engineer.

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is  $\pm 1.0$  percent and the suspension limit is  $\pm 1.5$  percent of the specified values. If no value is specified, apply the air content value used in the approved mix design.

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 RSC.

Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

**41-9.01D(6)(c) Reserved****41-9.01D(7) Acceptance Criteria****41-9.01D(7)(a) General**

The final texture of ISR—RSC must pass visual inspection and have a coefficient of friction of at least 0.30 determined under California Test 342.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic.

**41-9.01D(7)(b) Modulus of Rupture**

ISR—RSC is accepted based on your testing for modulus of rupture at opening age and the Department's testing for modulus of rupture at 3 days.

ISR—RSC must have a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is at least 600 psi.

Calculate the test result as the average from testing 3 beams for each sample. The test result represents 1 paving shift or 130 cu yd, whichever is less.

**41-9.01D(7)(c) Concrete Pavement Smoothness**

The Department tests for concrete pavement smoothness using a 12-foot straightedge. Straightedge smoothness specifications do not apply to the pavement surface placed within 12 inches of existing concrete pavement except parallel to the centerline at the midpoint of a transverse construction joint.

The concrete pavement surface must not vary from the lower edge of a 12-foot straightedge by more than:

1. 0.01 feet when parallel to the centerline
2. 0.02 feet when perpendicular to the centerline extending from edge to edge of a traffic lane

**41-9.01D(7)(d) Cracking and Raveling**

The Engineer rejects an ISR—RSC slab under section 6-3.06 if within 1 year of contract acceptance there is either:

1. Partial or full-depth cracking
2. Concrete raveling consisting of either:
  - 2.1. Combined raveled areas more than 5 percent of each ISR—RSC slab area
  - 2.2. Any single raveled area of more than 4 sq ft

**41-9.01D(8) Reserved****41-9.02 MATERIALS****41-9.02A General**

Reserved

**41-9.02B Rapid Strength Concrete**

RSC for ISR—RSC must comply with section 90-3.

Use either the 1-1/2 inch maximum or the 1-inch maximum combined grading specified in section 90-1.02C(4)(d).

Air content must comply with the minimum requirements in section 40-1.02B(4).

**41-9.02C Base Bond Breaker**

Use base bond breaker no. 3, 4, or 5 under section 36-2.

#### **41-9.02D Reserved**

### **41-9.03 CONSTRUCTION**

#### **41-9.03A General**

Complete ISR—RSC adjacent to new pavement or existing pavement shown for construction as a 1st order of work. Replace individual slabs damaged during construction before placing final pavement delineation.

#### **41-9.03B Removing Existing Pavement**

Remove pavement under section 15-2.02. The Engineer determines the exact ISR—RSC limits after overlying layers are removed.

After removing pavement to the depth shown, grade to a uniform plane. Water as needed and compact the material remaining in place to a firm and stable base. The finished surface of the remaining material must not extend above the grade established by the Engineer.

#### **41-9.03C Drill and Bond Dowel Bars**

Drill existing concrete and bond dowel bars under section 41-10 if described. Do not install dowel bars in contraction joints.

#### **41-9.03D Base Bond Breaker**

Place base bond breaker before placing ISR—RSC. Comply with section 36-2.

#### **41-9.03E Placing Rapid Strength Concrete**

Do not place RSC if the ambient air temperature is forecast by the National Weather Service to be less than 40 degrees F within 72 hours of final finishing.

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 full depth of pavement to the top of the base layer. 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.

Use metal or wood side forms. Wood side forms must not be less than 1-1/2 inches thick. Side forms and connections must be of sufficient rigidity that movement will not occur under forces from equipment or RSC. Clean and oil side forms before each use. Side forms must remain in place until the pavement edge no longer requires the protection of forms.

After you place RSC, consolidate it using high-frequency internal vibrators 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 concrete pavement.

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. You may request authorization to use surface finishing additives. Submit the manufacturer's instructions with your request.

Place consecutive concrete loads without interruption. Do not allow cold joints where a visible lineation forms after concrete is placed, sets, and hardens before additional concrete placed.

Where the existing transverse joint spacing in an adjacent lane exceeds 15 feet, construct an additional transverse contraction joint midway between the existing joints. Complete sawing of contraction joints within 2 hours of completion of final finishing.

Cut contraction joints a minimum of 1/3 the slab depth.

#### **41-9.03F Final Finishing**

After preliminary finishing, round the edges of the initial paving width to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius. Mark each ISR—RSC area with a stamp. The stamp mark must show the month, day, and year of placement and contract number. Level the location of the stamp with a steel trowel below the pavement texture. Orient the stamp mark so it can be read from the outside edge of ISR—RSC.

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.

Tines must be from 3/32 to 1/8 inch wide on 3/4-inch centers and have enough length, thickness, and resilience to form grooves from 1/8 to 3/16 inch deep after the concrete has hardened. Grooves must extend over the entire pavement width except do not construct grooves 3 inches from longitudinal pavement edges or joints.

Final texture must be uniform and smooth. Grooves must be parallel and aligned to the pavement edge across the pavement width. The groove alignment must not vary more than 0.1 foot for every 12 foot length.

Protect RSC under section 90-1.03C.

#### **41-9.03G Temporary Pavement Structure**

Temporary pavement structure must be RSC or 3-1/2 inch thick HMA over aggregate base.

#### **41-9.03H Noncompliant Individual Slab Replacement**

Replace an ISR—RSC slab with any of the following:

1. One or more full-depth cracks.
2. Concrete raveling.
3. Noncompliant smoothness except you may request authorization for grinding under section 42 and retesting. Grinding that causes a depression will not be considered. Smoothness must be corrected within 48 hours of placing ISR—RSC.
4. Noncompliant modulus of rupture.

If the modulus of rupture at opening age is at least 400 psi and the modulus of rupture at 3 days is at least 500 psi but less than 600 psi, you may request authorization to leave the ISR—RSC in place and accept the specified deduction.

If pavement is noncompliant for coefficient of friction, groove or grind the pavement under section 42. Comply with section 40-1.03Q(4) and groove or grind before the installation of any required joint seal or edge drains adjacent to the areas to the noncompliant area.

If an ISR—RSC slab has partial depth cracking, treat it with high-molecular-weight methacrylate under section 41-3.

#### **41-9.03I Replace Pavement Delineation**

Replace traffic stripes, pavement markings, and markers that are removed, obliterated, or damaged by ISR—RSC under sections 84 and 85.

#### **41-9.03J Reserved**

#### **41-9.04 PAYMENT**

Replace base is not included in the payment for individual slab replacement (RSC).

Drill and bond dowel bars are not included in payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 500 psi but less than 550 psi, the Department deducts 10 percent of the payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 550 psi but less than 600 psi, the Department deducts 5 percent of the payment for individual slab replacement (RSC).

## 41-10 DRILL AND BOND BARS

### 41-10.01 GENERAL

#### 41-10.01A Summary

Section 41-10 includes specifications for drilling, installing, and bonding tie bars and dowel bars in concrete pavement.

#### 41-10.01B Definitions

Reserved

#### 41-10.01C Submittals

Submit a certificate of compliance for:

1. Tie bars
2. Dowel bars
3. Dowel bar lubricant
4. Chemical adhesive
5. Epoxy powder coating

At least 15 days before delivery to the job site, submit the manufacturer's recommendations and instructions for storage, handling, and use of chemical adhesive.

#### 41-10.01D Quality Control and Assurance

##### 41-10.01D(1) General

Drill and bond bar is accepted based on inspection before concrete placement.

##### 41-10.01D(2) Reserved

#### 41-10.02 MATERIALS

##### 41-10.02A General

Dowel bar lubricant must comply with section 40-1.02D.

Chemical adhesive for drilling and bonding bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for concrete temperature and installation conditions.

Each chemical adhesive system container must clearly and permanently show the following:

1. Manufacturer's name
2. Model number of the system
3. Manufacture date
4. Batch number
5. Expiration date
6. Current International Conference of Building Officials Evaluation Report number
7. Directions for use
8. Storage requirement
9. Warnings or precautions required by state and federal laws and regulations

##### 41-10.02B Reserved

#### 41-10.03 CONSTRUCTION

##### 41-10.03A General

Drill holes for bars. Clean drilled holes in compliance with the chemical adhesive manufacturer's instructions. Holes must be dry at the time of placing the chemical adhesive and bars. Use a grout retention ring when drilling and bonding dowel bars. Immediately after inserting the bar into the chemical adhesive, support the bar to prevent movement until chemical adhesive has cured the minimum time recommended by the manufacturer.

Apply dowel bar lubricant to the entire exposed portion of the dowel bar.

If the Engineer rejects a bar installation: stop paving, drilling, and bonding activities. Adjust your procedures and obtain the Engineer's verbal authorization before resuming paving, drilling, and bonding.

Cut the rejected bar flush with the pavement joint surface and coat the exposed end of the bar with chemical adhesive. Offset the new hole 3 inches horizontally from the rejected hole's center.

**41-10.03B Tie Bar Tolerance**

Place tie bars within the tolerances shown in the following table:

<b>Tie Bar Tolerances</b>	
Dimension	Tolerance
Horizontal skew (vertical skew: bar length)	1:6
Vertical skew (vertical skew: bar length)	1:6
Longitudinal translation (inch)	±1
Horizontal offset (embedment, inch)	±1
Height relative to the adjacent bar	±1
Vertical Depth (clearance from the pavement surface or bottom, inches, min)	3

**41-10.03C Dowel Bar Tolerance**

Place dowel bars within the tolerances specified in section 40-1.01D(7)(b)(v).

**41-10.03D Reserved**

**41-10.04 PAYMENT**

Not Used

**41-11–41-15 RESERVED**

\*\*\*\*\*

**42 GROOVE AND GRIND CONCRETE**

07-19-13

**Replace the paragraph of section 42-1.01A with:**

Section 42-1 includes general specifications for grooving and grinding concrete.

07-19-13

**Replace the headings and paragraphs in section 42-3 with:**

**42-3.01 GENERAL**

**42-3.01A Summary**

Section 42-3 includes specifications for grinding the surfaces of pavement, bridge decks, and approach slabs.

**42-3.01B Definitions**

Reserved

**42-3.01C Submittals**

Reserved

**42-3.01D Quality Control and Assurance**

Reserved

**42-3.02 MATERIALS**

Not Used

07-19-13

### **42-3.03 CONSTRUCTION**

#### **42-3.03A General**

Grind surfaces in the longitudinal direction of the traveled way and grind the full lane width. Begin and end grinding at lines perpendicular to the roadway centerline.

Grinding must result in a parallel corduroy texture with grooves from 0.08 to 0.12 inch wide and from 55 to 60 grooves per foot of width. Grooves must be from 0.06 to 0.08 inch from the top of the ridge to the bottom of the groove.

Grind with abrasive grinding equipment using diamond cutting blades mounted on a self-propelled machine designed for grinding and texturing concrete pavements.

#### **42-3.03B Pavement**

Grind existing concrete pavement that is adjacent to an individual slab replacement. Grind the replaced individual slab and all the existing slabs immediately surrounding it. Grind after the individual slab is replaced.

Grind existing concrete pavement that is adjacent to new lanes of concrete pavement. Grind before paving.

After grinding, the existing pavement must comply with requirements for smoothness and coefficient of friction in section 40 except:

1. At the midpoint of a joint or crack, test smoothness with a straightedge. Both sides must have uniform texture.
2. Straightedge and inertial profiler requirements do not apply to areas abnormally depressed from subsidence or other localized causes. End smoothness testing 15 feet before and resume 15 feet after these areas.
3. Cross-slope must be uniform and have positive drainage across the traveled way and shoulder.

As an alternative to grinding existing concrete pavement, you may replace the existing pavement. The new concrete pavement must be the same thickness as the removed pavement. Replace existing pavement between longitudinal joints or pavement edges and transverse joints. Do not remove portions of slabs.

Replacement of existing concrete pavement must comply with requirements for individual slab replacement in section 41-9.

#### **42-3.03C Bridge Decks, Approach Slabs, and Approach Pavement**

Grind bridge decks, approach slabs, and approach pavement only if described.

The following ground areas must comply with the specifications for smoothness and concrete cover over reinforcing steel in section 51-1.01D(4):

1. Bridge decks
2. Approach slabs
3. Adjacent 50 feet of approach pavement

After grinding, the coefficient of friction must comply with section 51-1.01D(4).

#### **42-3.04 PAYMENT**

Grinding existing approach slabs and adjacent 50 feet of approach pavement is paid for as grind existing bridge deck.

The Department does not pay for grinding replacement concrete pavement or for additional grinding to comply with smoothness requirements.



section 90, except they must not contain chloride ions in excess of 0.25 percent by weight. Do not exceed 5 gallons of water per 94 lb of cement.

Mix the grout as follows:

1. Add water to the mixer followed by cement and any admixtures or fine aggregate.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after the initial mixing.

**Add to section 46-1.03B:**

04-20-12

Dispose of drill cuttings under section 19-2.03B.

**Add to the end of section 46-1.03C:**

07-19-13

Grouting equipment must be:

1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi

07-19-13

**Delete the 3rd paragraph of section 46-2.01A.**

**Add to the beginning of section 46-2.01C:**

07-19-13

Submittals for strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01C.

**Add to section 46-2.01D:**

07-19-13

**46-2.01D(3) Steel**

Strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01D.

**46-2.01D(4) Grout**

The Department tests the efflux time of the grout under California Test 541.

**Add to the beginning of section 46-2.02B:**

07-19-13

Strand tendons, bar tendons, and bar couplers must comply with section 50-1.02B.

**Replace the 1st paragraph of section 46-2.02E with:**

07-19-13

The efflux time of the grout immediately after mixing must be at least 11 seconds.



**Replace the 1st paragraph of section 47-2.02E with:**

02-17-12

Steel wire must comply with ASTM A 82/A 82M. Welded wire reinforcement must comply with ASTM A 185/A 185M.

**Replace section 47-3 with:**

07-19-13

**47-3 REINFORCED CONCRETE CRIB WALLS**

**47-3.01 General**

Section 47-3 includes specifications for constructing reinforced concrete crib walls.

Reinforced concrete crib walls must comply with section 51.

Reinforcement must comply with section 52.

Concrete crib walls consist of a series of rectangular cells composed of interlocking, precast, reinforced concrete headers, stretchers, and blocks.

**47-3.02 Materials**

**47-3.02A General**

Pads shown to be placed between bearing surfaces must either be (1) neoprene complying with the specifications for strip waterstops in section 51-2.05 or (2) commercial quality no. 30 asphalt felt. The protective board is not required for neoprene pads.

**47-3.02B Crib Members**

**47-3.02B(1) General**

All members may be manufactured to dimensions 1/8 inch greater in thickness than shown. The thickness of the lowest step must not be less than the dimension shown.

Stretchers may be manufactured 1/2 inch less in length than shown.

When an opening is shown in the face of the wall, special length stretchers and additional headers may be necessary.

For non-tangent wall alignments, special length stretchers may be required.

For non-tangent wall alignments and at locations where filler blocks are required, special length front face closure members may be required.

**47-3.02B(2) Reinforcement**

Reinforcing wire must comply with ASTM A 496/A 496M.

For hoops or stirrups use either (1) reinforcing wire or (2) deformed steel welded wire reinforcement. The size must be equivalent to the reinforcing steel shown. Deformed steel welded wire reinforcement must comply with ASTM A 497/A 497M.

**47-3.02B(3) Concrete**

Concrete test cylinders must comply with section 90-1.01D(5), except when the penetration of fresh concrete is less than 1 inch, the concrete in the test mold must be consolidated by vibrating the mold equivalent to the consolidating effort being used to consolidate the concrete in the members.

Cure crib members under section 51-4.02C.

When removed from forms, the members must present a true surface of even texture, free from honeycombs and voids larger than 1 inch in diameter and 5/16 inch in depth. Clean and fill other pockets with mortar under sections 51-1.02F and 51-1.03E(2).

External vibration resulting in adequate consolidation may be used.

If the Engineer determines that rock pockets are of the extent or character as to affect the strength of the member or to endanger the life of the steel reinforcement, replace the member.

Finish concrete-to-concrete bearing surfaces to a smooth plane. Section 51-1.03F does not apply to concrete crib members.

**47-3.03 Construction**

Place reinforced concrete crib walls to the lines and grades established by the Engineer. The foundation must be accepted by the Engineer before any crib members are placed.

The gap between bearing surfaces must not exceed 1/8 inch.

Where a gap of 1/16 inch to 1/8 inch exists or where shown, place a 1/16-inch pad of asphalt felt or sheet neoprene between the bearing surfaces.

**47-3.04 Payment**

The area of reinforced concrete crib wall is measured on the batter at the outer face for the height from the bottom of the bottom stretcher to the top of the top stretcher and for a length measured from end to end of each section of wall.

**Add between the 3rd and 4th paragraphs of section 47-5.01:**

Reinforcement must comply with section 52.

10-19-12

**Add to section 47-6.01A:**

The alternative earth retaining system must comply with the specifications for the type of wall being constructed.

10-19-12

**Replace "sets" at each occurrence in the 1st paragraph of section 47-6.01C with:**

copies

04-19-13

AA

**48 TEMPORARY STRUCTURES**

07-19-13

**Replace "previously welded splice" and its definition in section 48-2.01B with:**

**previously welded splice:** Splice made in a falsework member in compliance with AWS D1.1 or other recognized welding standard before contract award.

04-19-13

**Add to section 48-2.01B:**

**independent support system:** Support system that is in addition to the falsework removal system employing methods of holding falsework from above by winches, hydraulic jacks with prestressing steel, HS rods, or cranes.

07-19-13

**Delete "field" in the 1st sentence of the 5th paragraph of section 48-2.01C(1).**

04-19-13

**Replace item 1 in the list in the 6th paragraph of section 48-2.01C(1) with:**

04-19-13

1. Itemize the testing, inspection methods, and acceptance criteria used

**Replace "sets" at each occurrence in the 4th paragraph of section 48-2.01C(2) with:**

07-19-13

copies

**Replace the 7th paragraph of section 48-2.01C(2) with:**

09-16-11

If you submit multiple submittals at the same time or additional submittals before review of a previous submittal is complete:

1. You must designate a review sequence for submittals
2. Review time for any submittal is the review time specified plus 15 days for each submittal of higher priority still under review

**Add to section 48-2.01C(2):**

07-19-13

Shop drawings and calculations for falsework removal systems employing methods of holding falsework from above by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must include:

1. Design code used for the analysis of the structural members of the independent support system
2. Provisions for complying with current Cal/OSHA requirements
3. Load tests and ratings within 1 year of intended use of hydraulic jacks and winches
4. Location of the winches, hydraulic jacks with prestressing steel, HS rods, or cranes
5. Analysis showing that the bridge deck and overhang are capable of supporting all loads at all time
6. Analysis showing that winches will not overturn or slide during all stages of loading
7. Location of deck and soffit openings if needed
8. Details of repair for the deck and soffit openings after falsework removal

**Replace the 1st paragraph of section 48-2.01D(2) with:**

04-19-13

Welding must comply with AWS D1.1 or other recognized welding standard, except for fillet welds where the load demands are 1,000 lb or less per inch for each 1/8 inch of fillet weld.

**Replace the 1st through 3rd sentences in the 2nd paragraph of section 48-2.01D(2) with:**

04-19-13

Perform NDT on welded splices using UT or RT. Each weld and any repair made to a previously welded splice must be tested.

**Replace the 3rd paragraph of section 48-2.01D(2) with:**

04-19-13

For previously welded splices, perform and document all necessary testing and inspection required to certify the ability of the falsework members to sustain the design stresses.



**Replace the paragraph of section 49-2.01A(1) with:**

07-19-13

Section 49-2.01 includes general specifications for fabricating and installing driven piles.  
Epoxy-coated bar reinforcing steel used for pile anchors must comply with section 52-2.02.

**Replace the 2nd paragraph of section 49-2.01D with:**

01-20-12

Furnish piling is measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff.

**Replace the paragraph of section 49-2.02A(1) with:**

07-19-13

Section 49-2.02 includes specifications for fabricating and installing steel pipe piles.

**Replace the definitions in section 49-2.02A(2) with:**

07-19-13

**shop welding:** Welding performed at a plant on the Department's Authorized Facility Audit List.

**field welding:** Welding not performed at a plant on the Department's Authorized Facility Audit List.

**Replace item 2 in the list in the paragraph of section 49-2.02A(3)(b) with:**

07-19-13

2. Certified mill test reports for each heat number of steel used in pipe piles being furnished.

**Replace the paragraph of section 49-2.02A(4)(a) with:**

07-19-13

Section 11-3.02 does not apply to shop welds in steel pipe piles fabricated at a facility on the Department's Authorized Facility Audit List.

For groove welds using submerged arc welding from both sides without backgouging, qualify the WPS under Table 4.5 of AWS D1.1.

**Replace "0.45" in the 2nd paragraph of section 49-2.02B(1)(a) with:**

07-19-13

0.47

**Replace the 1st paragraph of section 49-2.02B(1)(b) with:**

07-19-13

Welds must comply with AWS D1.1. Circumferential welds must be CJP welds.

**Delete the 5th paragraph of section 49-2.02B(1)(b).**

07-19-13

**Add to section 49-2.02B(1):**

07-19-13

**49-2.02B(1)(d) Reserved**

**Replace "4.8.4" in item 2.3 in the list in the 2nd paragraph of section 49-2.02B(2) with:**

07-19-13

4.9.4

**Delete the 3rd paragraph of section 49-2.02C(2).**

07-19-13

**Replace the paragraph of section 49-2.03A(1) with:**

07-19-13

Section 49-2.03 includes specifications for fabricating and installing structural shape steel piles.

**Replace the paragraph of section 49-2.03A(3) with:**

07-19-13

Submit a certified material test report and a certificate of compliance that includes a statement that all materials and workmanship incorporated in the work and all required tests and inspections of this work have been performed as described.

**Replace the 1st paragraph of section 49-2.03B with:**

07-19-13

Structural shape steel piles must comply with ASTM A 36/A 36M, ASTM A 572/A 572M, ASTM A 709/A 709M, or ASTM A 992/A 992M.

**Replace "sets" in the 1st paragraph of section 49-2.04A(3) with:**

04-19-13

copies

**Delete the 1st paragraph of section 49-2.04A(4).**

07-19-13

**Replace the 3rd and 4th paragraphs of section 49-2.04B(2) with:**

10-19-12

Piles in a corrosive environment must be steam or water cured under section 90-4.03.

If piles in a corrosive environment are steam cured, either:

1. Keep the piles continuously wet for at least 3 days. The 3 days includes the holding and steam curing periods.
2. Apply curing compound under section 90-1.03B(3) after steam curing.

**Replace the 1st paragraph of section 49-3.01A with:**

07-19-13

Section 49-3.01 includes general specifications for constructing CIP concrete piles.

**Add to section 49-3.01A:**

01-20-12

Concrete must comply with section 51.

**Replace the 1st paragraph of section 49-3.01C with:**

01-20-12

Except for CIDH concrete piles constructed under slurry, construct CIP concrete piles such that the excavation methods and the concrete placement procedures provide for placing the concrete against undisturbed material in a dry or dewatered hole.

**Replace "Reserved" in section 49-3.02A(2) with:**

01-20-12

**dry hole:**

1. Except for CIDH concrete piles specified as end bearing, a drilled hole that:
  - 1.1. Accumulates no more than 12 inches of water in the bottom of the drilled hole during a period of 1 hour without any pumping from the hole during the hour.
  - 1.2. Has no more than 3 inches of water in the bottom of the drilled hole immediately before placing concrete.
2. For CIDH concrete piles specified as end bearing, a drilled hole free of water without the use of pumps.

**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 5 in the list in the 1st paragraph of section 49-3.02A(3)(b) with:**

10-19-12

5. Methods and equipment for determining:
  - 5.1. Depth of concrete
  - 5.2. Theoretical volume of concrete to be placed, including the effects on volume if casings are withdrawn
  - 5.3. Actual volume of concrete placed

**Add to the list in the 1st paragraph of section 49-3.02A(3)(b):**

01-18-13

8. Drilling sequence and concrete placement plan.

**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 "49-2.03A(4)(d)" in the 1st paragraph of section 49-3.02A(4)(d)(i) with:**

07-19-13

49-3.02A(4)(d)

**Add to the beginning of section 49-3.02A(4)(d)(ii):**

07-19-13

If the drilled hole is dry or dewatered without the use of temporary casing to control ground water, installation of inspection pipes is not required.

**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:**

07-19-13

Grout must consist of cementitious material and water, and may contain an admixture if authorized. Do not exceed 5 gallons of water per 94 lb of cement.

Cementitious material must comply with section 90-1.02B, except SCMs are not required.

Water must comply with section 90-1.02D. If municipally supplied potable water is used, the testing specified in section 90-1.02D is waived.

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.

Use aggregate to extend the grout as follows:

1. Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
2. Fine aggregate must comply with section 90-1.02C(3).
3. Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 85 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
4. Minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.

Mix the grout as follows:

1. Add water to the mixer followed by cementitious material, aggregates, and any admixtures.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after initial mixing.

**Replace section 49-3.02B(8) with:**

01-20-12

**49-3.02B(8) Spacers**

Spacers must comply with section 52-1.03D, except you may use plastic spacers.

Plastic spacers must:

1. Comply with sections 3.4 and 3.5 of the Concrete Reinforcing Steel Institute's *Manual of Standard Practice*
2. Have at least 25 percent of their gross plane area perforated to compensate for the difference in the coefficient of thermal expansion between the plastic and concrete
3. Be of commercial quality

**Add between the 1st and 2nd paragraphs of section 49-3.02C(2):**

07-19-13

For CIDH concrete piles with a pile cap, the horizontal tolerance at the center of each pile at pile cut-off is the larger of 1/24 of the pile diameter or 3 inches. The horizontal tolerance for the center-to-center spacing of 2 adjacent piles is the larger of 1/24 of the pile diameter or 3 inches.

**Add to section 49-3.02C(4):**

01-20-12

Unless otherwise shown, the bar reinforcing steel cage must have at least 3 inches of clear cover measured from the outside of the cage to the sides of the hole or casing.

Place spacers at least 5 inches clear from any inspection tubes.

Place plastic spacers around the circumference of the cage and at intervals along the length of the cage, as recommended by the manufacturer.

07-19-13

For a single CIDH concrete pile supporting a column:

1. If the pile and the column share the same reinforcing cage diameter, this cage must be accurately placed as shown
2. If the pile reinforcing cage is larger than the column cage and the concrete is placed under dry conditions, maintain a clear horizontal distance of at least 3.5 inches between the two cages
3. If the pile reinforcing cage is larger than the column cage and the concrete is placed under slurry, maintain a clear horizontal distance of at least 5 inches between the two cages

**Replace section 49-3.02C(6) with:**

07-19-13

**49-3.02C(6) Construction Joint**

Section 49-3.02C(6) applies to CIDH concrete piles where a construction joint is shown.

If a permanent steel casing is not shown, you must furnish and install a permanent casing. The permanent casing must:

1. Be watertight and of sufficient strength to prevent damage and to withstand the loads from installation procedures, drilling and tooling equipment, lateral concrete pressures, and earth pressures.
2. Extend at least 5 feet below the construction joint. If placing casing into rock, the casing must extend at least 2 feet below the construction joint.
3. Not extend above the top of the drilled hole or final grade whichever is lower.
4. Not increase the diameter of the CIDH concrete pile more than 2 feet.
5. Be installed by impact or vibratory hammers, oscillators, rotators, or by placing in a drilled hole. Casings placed in a drilled hole must comply with section 49-3.02C(5).

Section 49-2.01A(4)(b) does not apply to permanent casings specified in this section.

**Add to section 49-4.01:**

07-19-13

Steel soldier piles must comply with section 49-2.03.

**Replace the headings and paragraphs in section 49-4.02 with:**

07-19-13

Concrete anchors must comply with the specifications for studs in clause 7 of AWS D1.1.

AA

**50 PRESTRESSING CONCRETE**

07-19-13

**Replace "sets" at each occurrence in the 2nd and 3rd paragraphs of section 50-1.01C(3) with:**

04-19-13

copies

**Add to section 50-1.01C(3):**

07-19-13

Include a grouting plan with your shop drawing submittal. The grouting plan must include:

1. Detailed grouting procedures
2. Type, quantity, and brand of materials to be used
3. Type of equipment to be used including provisions for backup equipment
4. Types and locations of grout inlets, outlets, and vents
5. Methods to clean ducts before grouting
6. Methods to control the rate of flow within ducts
7. Theoretical grout volume calculations for each duct
8. Duct repair procedures due to an air pressure test failure
9. Mixing and pumping procedures
10. Direction of grouting
11. Sequence of use of inlets and outlets
12. Procedure for handling blockages
13. Proposed forms for recording grouting information
14. Procedure for secondary grouting
15. Names of people who will perform grouting activities including their relevant experience and certifications

**Add to section 50-1.01C:**

07-19-13

**50-1.01C(5) Grout**

Submit a daily grouting report for each day grouting is performed. Submit the report within 3 days after grouting. The report must be signed by the technician supervising the grouting activity. The report must include:

1. Identification of each tendon
2. Date grouting occurred
3. Time the grouting started and ended
4. Date of placing the prestressing steel in the ducts
5. Date of stressing
6. Type of grout used
7. Injection end and applied grouting pressure
8. Actual and theoretical quantity of grout used to fill duct
9. Ratio of actual to theoretical grout quantity
10. Records of air, grout, and structure surface temperatures during grouting.
11. Summary of tests performed and results, except submit compressive strength and chloride ion test results within 48 hours of test completion
12. Names of personnel performing the grouting activity
13. Summary of problems encountered and corrective actions taken
14. Summary of void investigations and repairs made

**Replace the introductory clause in the 1st paragraph of section 50-1.01C(4) with:**

07-19-13

Submit test samples for the materials shown in the following table to be used in the work:

**Add between "the" and "test samples" in the 1st paragraph of section 50-1.01D(2):**

07-19-13

prestressing steel

**Replace the 3rd paragraph of section 50-1.01D(2) with:**

10-19-12

The Department may verify the prestressing force using the Department's load cells.

**Replace the 3rd paragraph in section 50-1.01D(3) with:**

07-19-13

Each pressure gage must be fully functional and have an accurately reading, clearly visible dial or display. The dial must be at least 6 inches in diameter and graduated in 100 psi increments or less.

**Add between the 5th and 6th paragraphs of section 50-1.01D(3):**

07-19-13

Each jack and its gages must be calibrated as a unit.

**Replace the 6th paragraph in section 50-1.01D(3) with:**

07-19-13

Each jack used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength must be calibrated by METS within 1 year of use and after each repair. You must:

1. Schedule the calibration of the jacking equipment with METS
2. Mechanically calibrate the gages with a dead weight tester or other authorized means before calibration of the jacking equipment by METS
3. Verify that the jack and supporting systems are complete, with proper components, and are in good operating condition
4. Provide labor, equipment, and material to (1) install and support the jacking and calibration equipment and (2) remove the equipment after the calibration is complete
5. Plot the calibration results

Each jack used to tension prestressing steel permanently anchored at less than 25 percent of its specified minimum ultimate tensile strength must be calibrated by an authorized laboratory within 6 months of use and after each repair.

#### **Add to section 50-1.01D:**

07-19-13

#### **50-1.01D(4) Pressure Testing Ducts**

For post-tensioned concrete bridges, pressure test each duct with compressed air after stressing. To pressure test the ducts:

1. Seal all inlets, outlets, and grout caps.
2. Open all inlets and outlets on adjacent ducts.
3. Attach an air compressor to an inlet at 1 end of the duct. The attachment must include a valve that separates the duct from the air source.
4. Attach a pressure gage to the inlet at the end of the duct.
5. Pressurize the duct to 50 psi.
6. Lock-off the air source.
7. Record the pressure loss after 1 minute.
8. If there is a pressure loss exceeding 25 psi, repair the leaks with authorized methods and retest.

Compressed air used to clear and test the ducts must be clean, dry, and free of oil or contaminants.

#### **50-1.01D(5) Duct Demonstration of Post-Tensioned Members**

Before placing forms for deck slabs of box girder bridges, demonstrate that any prestressing steel placed in the ducts is free and unbonded. If no prestressing steel is in the ducts, demonstrate that the ducts are unobstructed.

If prestressing steel is installed after the concrete is placed, demonstrate that the ducts are free of water and debris immediately before installing the steel.

Before post-tensioning any member, demonstrate that the prestressing steel is free and unbonded in the duct.

The Engineer must witness all demonstrations.

#### **50-1.01D(6) Void Investigation**

In the presence of the Engineer, investigate the ducts for voids between 24 hours and 72 hours after grouting completion. As a minimum, inspect the inlet and outlet ports at the anchorages and at high points in the tendons for voids after removal. Completely fill any voids found with secondary grout.

#### **50-1.01D(7) Personnel Qualifications**

Perform post-tensioning field activities, including grouting, under the direct supervision of a technician certified as a level 2 Bonded PT Field Specialist through the Post-Tensioning Institute. Grouting activities may be performed under the direct supervision of a technician certified as a Grouting Technician through the American Segmental Bridge Institute.

**Replace the 6th paragraph of section 50-1.02B with:**

07-19-13

Package the prestressing steel in containers or shipping forms that protect the steel against physical damage and corrosion during shipping and storage.

**Replace the 13th paragraph of section 50-1.02B with:**

07-19-13

Prestressing steel is rejected if surface rust either:

1. Cannot be removed by hand-cleaning with a fine steel wool pad
2. Leaves pits visible to the unaided eye after cleaning

**Replace the 4th paragraph of section 50-1.02C with:**

07-19-13

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.

**Delete the 5th paragraphs of section 50-1.02C.**

07-19-13

**Add to section 50-1.02C:**

07-19-13

Secondary grout must:

1. Comply with ASTM C 1107
2. Not have a deleterious effect on the steel, concrete, or bond strength of the steel to concrete

**Replace item 9 including items 9.1 and 9.2 in the list in the 1st paragraph of section 50-1.02D with:**

07-19-13

9. Have an inside cross-sectional area of at least 2.5 times the net area of the prestressing steel for multistrand tendons

**Replace "3/8" in item 10 in the list in the 1st paragraph of section 50-1.02D with:**

07-19-13

1/2

**Delete the 2nd sentences in the 1st paragraph of section 50-1.02E.**

07-19-13

**Replace section 50-1.02F with:**

07-19-13

**50-1.02F Permanent Grout Caps**

Permanent grout caps for anchorage systems of post-tensioned tendons must:

1. Be glass-fiber-reinforced plastic with antioxidant additives. The environmental stress-cracking failure time must be at least 192 hours under ASTM D 1693, Condition C.

2. Completely cover and seal the wedge plate or anchorage head and all exposed metal parts of the anchorage against the bearing plate using neoprene O-ring seals.
3. Have a grout vent at the top of the cap.
4. Be bolted to the anchorage with stainless steel complying with ASTM F 593, alloy 316. All fasteners, including nuts and washers, must be alloy 316.
5. Be pressure rated at or above 150 psi.

**Add to section 50-1.02:**

09-16-11

**50-1.02G Sheathing**

Sheathing for debonding prestressing strand must:

1. Be split or un-split flexible polymer plastic tubing
2. Have a minimum wall thickness of 0.025 inch
3. Have an inside diameter exceeding the maximum outside diameter of the strand by 0.025 to 0.14 inch

Split sheathing must overlap at least 3/8 inch.

Waterproofing tape used to seal the ends of the sheathing must be flexible adhesive tape.

The sheathing and waterproof tape must not react with the concrete, coating, or steel.

**Replace the 2nd paragraph of section 50-1.03A(3) with:**

07-19-13

After installation, cover the duct ends and vents to prevent water or debris from entering.

**Add to section 50-1.03A(3):**

07-19-13

Support ducts vertically and horizontally during concrete placement at a spacing of at most 4 feet.

**Delete "at least" in the 1st paragraph of section 50-1.03B(1).**

07-19-13

**Add to section 50-1.03B(1):**

01-20-12

After seating, the maximum tensile stress in the prestressing steel must not exceed 75 percent of the minimum ultimate tensile strength shown.

**Delete the 1st through 4th paragraphs of section 50-1.03B(2)(a).**

07-19-13

**Replace "temporary tensile strength" in the 7th paragraph of section 50-1.03B(2)(a) with:**

07-19-13

temporary tensile stress

**Add to section 50-1.03B(2)(a):**

07-19-13

If prestressing strand is installed using the push-through method, use guide caps at the front end of each strand to protect the duct from damage.

**Add to the list in the 2nd paragraph of section 50-1.03B(2)(c):**

07-19-13

3. Be equipped with permanent grout caps

**Replace section 50-1.03B(2)(d) with:**

07-19-13

**50-1.03B(2)(d) Bonding and Grouting**

**50-1.03B(2)(d)(i) General**

Bond the post-tensioned prestressing steel to the concrete by completely filling the entire void space between the duct and the prestressing steel with grout.

Ducts, vents, and grout caps must be clean and free from water and deleterious materials that would impair bonding of the grout or interfere with grouting procedures. Compressed air used for cleaning must be clean, dry, and free of oil or contaminants.

Prevent the leakage of grout through the anchorage assembly by positive mechanical means.

Before starting daily grouting activities, drain the pump system to remove any water from the piping system.

Break down and thoroughly clean the pump and piping system after each grouting session.

After completing duct grouting activities:

1. Abrasive blast clean and expose the aggregate of concrete surfaces where concrete is to be placed to cover and encase the anchorage assemblies
2. Remove the ends of vents 1 inch below the roadway surface

**50-1.03B(2)(d)(ii) Mixing and Proportioning**

Proportion solids by weight to an accuracy of 2 percent.

Proportion liquids by weight or volume to an accuracy of 1 percent.

Mix the grout as follows:

1. Add water to the mixer followed by the other ingredients.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout without an excessive temperature increase or loss of properties of the mixture.
3. Do not exceed 5 gal of water per 94 lb of cement or the quantity of water in the manufacturer's instructions, whichever is less.
4. Agitate the grout continuously until the grout is pumped. Do not add water after the initial mixing.

**50-1.03B(2)(d)(iii) Placing**

Pump grout into the duct within 30 minutes of the 1st addition of the mix components.

Inject grout from the lowest point of the duct in an uphill direction in 1 continuous operation maintaining a one-way flow of the grout. You may inject from the lowest anchorage if complete filling is ensured.

Before injecting grout, open all vents.

Continuously discharge grout from the vent to be closed. Do not close any vent until free water, visible slugs of grout, and entrapped air have been ejected and the consistency of the grout flowing from the vent is equivalent to the injected grout.

Pump the grout at a rate of 16 to 50 feet of duct per minute.

Conduct grouting at a pressure range of 10 to 50 psi measured at the grout inlet. Do not exceed maximum pumping pressure of 150 psi at the grout inlet.

As grout is injected, close the vents in sequence in the direction of flow starting with the closest vent.

Before closing the final vent at the grout cap, discharge at least 2 gal of grout into a clean receptacle.

Bleed all high point vents.

Lock a pressure of 5 psi into the duct by closing the grout inlet valve.

#### **50-1.03B(2)(d)(iv) Weather Conditions**

If hot weather conditions will contribute to quick stiffening of the grout, cool the grout by authorized methods as necessary to prevent blockages during pumping activities.

If freezing weather conditions are anticipated during and following the placement of grout, provide adequate means to protect the grout in the ducts from damage by freezing.

#### **50-1.03B(2)(d)(v) Curing**

During grouting and for a period of 24 hours after grouting, eliminate vibration from contractor controlled sources within 100 feet of the span in which grouting is taking place, including from moving vehicles, jackhammers, large compressors or generators, pile driving activities, soil compaction, and falsework removal. Do not vary loads on the span.

For PC concrete members, do not move or disturb the members after grouting for 24 hours. If ambient temperature drops below 50 degrees F, do not move or disturb the members for 48 hours.

Do not remove or open valves until grout has cured for at least 24 hours.

#### **50-1.03B(2)(d)(vi) Grouting Equipment**

Grouting equipment must be:

1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi
3. Able to continuously grout the longest tendon on the project in less than 20 minutes

Grout must pass through a screen with clear openings of 1/16 inch or less before entering the pump.

Fit grout injection pipes, ejection pipes, and vents with positive mechanical shutoff valves capable of withstanding the pumping pressures. Do not remove or open valves until the grout has set. If authorized, you may substitute mechanical valves with suitable alternatives after demonstrating their effectiveness.

Provide a standby grout mixer and pump.

#### **50-1.03B(2)(d)(vii) Grout Storage**

Store grout in a dry environment.

#### **50-1.03B(2)(d)(viii) Blockages**

If the grouting pressure reaches 150 psi, close the inlet and pump the grout at the next vent that has just been or is ready to be closed as long as a one-way flow is maintained. Do not pump grout into a succeeding outlet from which grout has not yet flowed.

When complete grouting of the tendon cannot be achieved by the steps specified, stop the grouting operation.

#### **50-1.03B(2)(d)(ix) Secondary Grouting**

Perform secondary grouting by vacuum grouting under the direct supervision of a person who has been trained and has experience in the use of vacuum grouting equipment and procedures.

The vacuum grouting process must be able to determine the size of the void and measure the volume of grout filling the void.



7. Pipe culvert headwalls, endwalls, and wingwalls for a pipe with a diameter of 5 feet or greater

Falsework must comply with section 48-2.

Joints must comply with section 51-2.

Elastomeric bearing pads must comply with section 51-3.

Reinforcement for the following concrete structures must comply with section 52:

1. Sound wall footings
2. Sound wall pile caps
3. Barrier slabs
4. Junction structures
5. Minor structures
6. PC concrete members

You may use RSC for a concrete structure only where the specifications allow the use of RSC.

**Replace "sets" in the 1st paragraph of section 51-1.01C(2) with:**

copies

07-19-13

**Replace the heading of section 51-1.01D(4) with:**

**Testing Concrete Surfaces**

04-19-13

**Add to section 51-1.01D(4)(a):**

The Engineer tests POC deck surfaces for smoothness and crack intensity.

04-19-13

**Add to the list in the 1st paragraph of section 51-1.01D(4)(b):**

3. Completed deck surfaces, including ramps and landings of POCs

04-19-13

**Replace the 4th paragraph in section 51-1.01D(4)(b) with:**

Except for POCs, surface smoothness is tested using a bridge profilograph under California Test 547. Two profiles are obtained in each lane approximately 3 feet from the lane lines and 1 profile is obtained in each shoulder approximately 3 feet from the curb or rail face. Profiles are taken parallel to the direction of traffic.

04-19-13

**Add between the 5th and 6th paragraphs of section 51-1.01D(4)(b):**

POC deck surfaces must comply with the following smoothness requirements:

04-19-13

1. Surfaces between grade changes must not vary more than 0.02 foot from the lower edge of a 12-foot-long straightedge placed parallel to the centerline of the POC
2. Surface must not vary more than 0.01 foot from the lower edge of a 6-foot-long straightedge placed perpendicular to the centerline of the POC

**Add to section 51-1.01D(4)(d):**

04-19-13

The Engineer measures crack intensity of POC deck surfaces after curing, before prestressing, and before falsework release. Clean the surface for the Engineer to measure surface crack intensity.

In any 100 sq ft portion of a new POC deck surface, if there are more than 10 feet of cracks having a width at any point of over 0.02 inch, treat the deck with methacrylate resin under section 15-5.05. Treat the entire deck width between the curbs to 5 feet beyond where the furthest continuous crack emanating from the 100 sq ft section is 0.02 inch wide. Treat the deck surface before grinding.

**Replace the 2nd paragraph of section 51-1.02B with:**

07-19-13

Except for minor structures, the minimum required 28-day compressive strength for concrete in structures or portions of structures is the compressive strength described or 3,600 psi, whichever is greater.

**Add to section 51-1.03C(2)(c)(i):**

04-20-12

Permanent steel deck forms are only allowed where shown or if specified as an option in the special provisions.

**Replace the 3rd paragraph of section 51-1.03C(2)(c)(ii) with:**

04-20-12

Compute the physical design properties under AISI's *North American Specification for the Design of Cold-Formed Steel Structural Members*.

**Replace the 8th paragraph of section 51-1.03D(1) with:**

10-19-12

Except for concrete placed as pipe culvert headwalls and endwalls, slope paving and aprons, and concrete placed under water, consolidate concrete using high-frequency internal vibrators within 15 minutes of placing concrete in the forms. Do not attach vibrators to or hold them against forms or reinforcing steel. Do not displace reinforcement, ducts, or prestressing steel during vibrating.

**Add to section 51-1.03E(5):**

08-05-11

Drill the holes without damaging the adjacent concrete. If reinforcement is encountered during drilling before the specified depth is attained, notify the Engineer. Unless coring through the reinforcement is authorized, drill a new hole adjacent to the rejected hole to the depth shown.

**Add to section 51-1.03F(5)(a):**

04-19-13

For approach slabs, sleeper slabs, and other roadway surfaces of concrete structures, texture the roadway surface as specified for bridge deck surfaces in section 51-1.03F(5)(b).

**Replace "Reserved" in section 51-1.03F(5)(b) with:**

04-20-12

**51-1.03F(5)(b)(i) General**

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

10-19-12

For bridge widenings, texture the deck surface longitudinally by longitudinal tining.

04-20-12

In freeze-thaw areas, do not texture PCC surfaces of bridge decks.

**51-1.03F(5)(b)(ii) Grinding and Grooving**

When texturing the deck surface by grinding and grooving, place a 1/4 inch of sacrificial concrete cover on the bridge deck above the finished grade shown. Place items to be embedded in the concrete based on the final profile grade elevations shown. Construct joint seals after completing the grinding and grooving.

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.

**Add to section 51-1.03F:**

04-19-13

**51-1.03F(6) Finishing Pedestrian Overcrossing Surfaces**

Construct deck surfaces, including ramps and landings of POCs to the grade and cross section shown. Surfaces must comply with the specified smoothness, surface texture, and surface crack requirements.

The Engineer sets deck elevation control points for your use in establishing the grade and cross section of the deck surface. The grade established by the deck elevation control points includes all camber allowances. Except for landings, elevation control points include the beginning and end of the ramp and will not be closer together than approximately 8 feet longitudinally and 4 feet transversely to the POC centerline. Landing elevation control points are at the beginning and the end of the landing.

Broom finish the deck surfaces of POCs. Apply the broom finish perpendicular to the path of travel. You may apply water mist to the surface immediately before brooming.

Clean any discolored concrete by abrasive blast cleaning or other authorized methods.

**Replace the paragraphs of section 51-1.04 with:**

10-19-12

If concrete involved in bridge work is not designated by type and is not otherwise paid for under a separate bid item, the concrete is paid for as structural concrete, bridge.

The payment quantity for structural concrete includes the volume in the concrete occupied by bar reinforcing steel, structural steel, prestressing steel materials, and piling.

The payment quantity for seal course concrete is the actual volume of seal course concrete placed except the payment quantity must not exceed the volume of concrete contained between vertical planes 1 foot outside the neat lines of the seal course shown. The Department does not adjust the unit price for an increase or decrease in the seal course concrete quantity.

Structural concrete for pier columns is measured as follows:

1. Horizontal limits are vertical planes at the neat lines of the pier column shown.
2. Bottom limit is the bottom of the foundation excavation in the completed work.
3. Upper limit is the top of the pier column concrete shown.

The payment quantity for drill and bond dowel is determined from the number and depths of the holes shown.

**Replace section 51-2.01B(2) with:**

04-19-13

**51-2.01B(2) Reserved**

04-19-13

**Delete the 4th paragraph of section 51-2.01C.**

**Replace "SSPC-QP 3" in the 1st paragraph of section 51-2.02A(2) with:**

10-19-12

AISC-420-10/SSPC-QP 3

**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 "sets" in the 1st and 2nd paragraphs of section 51-2.02D(1)(c)(ii) with:**

copies

04-19-13

**Replace "set" in the 7th paragraph of section 51-2.02D(1)(c)(ii) with:**

copy

04-19-13

**Add to the 1st paragraph of section 51-2.02D(3):**

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

04-19-13

**Replace "sets" in the 2nd paragraph of section 51-2.02E(1)(c) with:**

copies

04-19-13

**Replace "set" in the 6th paragraph of section 51-2.02E(1)(c) with:**

copy

04-19-13

**Replace the 2nd paragraph of section 51-2.02E(1)(e) with:**

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.

08-05-11

**Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02F(1)(c) with:**

copies

04-19-13

**Add between the 1st and 2nd paragraphs of section 51-4.01A:**

Prestressing concrete members must comply with section 50.

10-19-12

**Delete the 2nd paragraph of section 51-4.01A.**

04-20-12

**Replace the 3rd paragraph of section 51-4.01C(2) with:**

For segmental or spliced-girder construction, shop drawings must include the following additional information:

04-20-12

1. Details showing construction joints or closure joints
2. Arrangement of bar reinforcing steel, prestressing tendons, and pressure-grouting pipe
3. Materials and methods for making closures
4. Construction joint keys and surface treatment
5. Other requested information

For segmental girder construction, shop drawings must include concrete form and casting details.

**Replace "sets" in the 1st paragraph of section 51-4.01C(3) with:**

copies

04-19-13

**Delete the 1st and 2nd paragraphs of section 51-4.02A.**

10-19-12

**Replace the 3rd paragraph of section 51-4.02B(2) with:**

04-20-12

For segmental or spliced-girder construction, materials for construction joints or closure joints at exterior girders must match the color and texture of the adjoining concrete.

**Add to section 51-4.02B(2):**

04-20-12

At spliced-girder closure joints:

1. If shear keys are not shown, the vertical surfaces of the girder segment ends must be given a coarse texture as specified for the top surface of PC members.
2. Post-tensioning ducts must extend out of the vertical surface of the girder segment closure end sufficiently to facilitate splicing of the duct.

For spliced girders, pretension strand extending from the closure end of the girder segment to be embedded in the closure joint must be free of mortar, oil, dirt, excessive mill scale and scabby rust, and other coatings that would destroy or reduce the bond.

**Add to section 51-4.03B:**

04-20-12

The specifications for prestressing force distribution and sequencing of stressing in the post-tensioning activity in 50-1.03B(2)(a) do not apply if post-tensioning of spliced girders before starting deck construction is described. The composite deck-girder structure must be post-tensioned in a subsequent stage.

Temporary spliced-girder supports must comply with the specifications for falsework in section 48-2.

Before post-tensioning of spliced girders, remove the forms at CIP concrete closures and intermediate diaphragms to allow inspection for concrete consolidation.

**Add to section 51-5.01A:**

07-19-13

Structure excavation and backfill must comply with section 19-3.

Treated permeable base must comply with section 29.







12. Material specification and grade listed on the bill of materials.
13. Identification of tension members and fracture critical members.
14. Proposed deviations from plans, specifications, or previously submitted shop drawings.
15. Contract plan sheet references for details.

**Replace items 2 and 3 in the list in the 1st paragraph of section 55-1.01C(3) with:**

2. Tension flanges and webs of horizontally curved girders
3. Hanger plates

07-19-13

**Replace the 2nd paragraph of section 55-1.01C(3) with:**

Furnish plates, shapes, or bars with extra length to provide for removal of check samples.

07-19-13

**Delete the 1st and 2nd sentences in the 3rd paragraph of section 55-1.01C(3).**

07-19-13

**Replace the 4th paragraph of section 55-1.01C(3) with:**

Remove material for test samples in the Engineer's presence. Test samples for plates over 24 inches wide must be 10 by 12 inches with the long dimension transverse to the direction of rolling. Test samples for other products must be 12 inches long taken in the direction of rolling with a width equal to the product width.

07-19-13

**Replace the 1st sentence of the 6th paragraph in section 55-1.01C(3) with:**

Results of check testing are delivered to you within 20 days of receipt of samples at METS.

07-19-13

**Delete the 2nd paragraph of section 55-1.01D(1).**

07-19-13

**Replace the 2nd sentence of the 4th paragraph in section 55-1.01D(1) with:**

The calibration must be performed by an authorized repair and calibration center approved by the tool manufacturer.

07-19-13

**Add to section 55-1.01D(1):**

For bolts installed as snug tight, rotational capacity testing and installation tension testing are not required.

07-19-13

In addition to NDT requirements in AWS D1.5, ultrasonically test 25 percent of all main member tension butt welds in material over 1/2 inch thick.

Perform NDT on 100 percent of each pin as follows:

1. MT under ASTM A 788, S 18, with no linear indication allowed exceeding 3 mm
2. UT under ASTM A 788, S 20, level S and level DA in two perpendicular directions

The Engineer determines the location of all NDT testing for welding.

07-19-13

**Delete the 2nd paragraph of section 55-1.01D(3)(a).**

**Replace section 55-1.01D(4)(b) with:**

07-19-13

Perform rotational capacity testing on each rotational capacity lot under section 55-1.01D(3)(b) at the job site before installation.

**Replace the 1st sentence of the 2nd paragraph in section 55-1.01D(4)(c) with:**

07-19-13

Test 3 representative HS fastener assemblies under section 8 of *Specification for Structural Joints Using High-Strength Bolts* of the RCSC.

**Replace the 1st paragraph in section 55-1.01D(4)(d) with:**

07-19-13

Perform fastener tension testing to verify minimum tension in HS bolted connections no later than 48 hours after all fasteners in a connection have been tensioned.

**Replace the 3rd paragraph in section 55-1.01D(4)(d) with:**

07-19-13

Test 10 percent of each type of fastener assembly in each HS bolted connection for minimum tension using the procedure described in section 10 of *Specification for Structural Joints Using High-Strength Bolts* of the RCSC. Check at least 2 assemblies per connection. For short bolts, determine the inspection torque using steps 1 through 7 of "Arbitration of Disputes, Torque Method-Short Bolts" in *Structural Bolting Handbook* of the Steel Structures Technology Center.

**Replace the 1st table in the 1st paragraph of section 55-1.02A(1) with:**

07-19-13

**Structural Steel**

Material	Specification
Carbon steel	ASTM A 709/A 709M, Grade 36 or {ASTM A36/A36M} <sup>a</sup>
HS low alloy columbium vanadium steel	ASTM A 709/A 709M, Grade 50 or {ASTM A 992/A 992M or ASTM A 572/A 572M, Grade 50} <sup>a</sup>
HS low alloy structural steel	ASTM A 709/A 709M, Grade 50W or Grade HPS 50W, or {ASTM A 588/A 588M} <sup>a</sup>
HS low alloy structural steel plate	ASTM A 709/A 709M, Grade HPS 70W
High-yield strength quenched and tempered alloy steel plate suitable for welding	ASTM A 709/A 709M, Grade 100, Grade 100W, or Grade HPS 100W, or {ASTM A 514/A 514M} <sup>a</sup>

<sup>a</sup>Grades you may substitute for the equivalent ASTM A 709 steel subject to the modifications and additions specified and to the requirements of ASTM A 709.

Replace the 2nd table in the 1st paragraph of section 55-1.02A(1) with:

07-19-13

<b>Fasteners</b>	
Material	Specification
Steel fastener components for general applications:	
Bolts and studs	ASTM A 307
Anchor bolts	ASTM F 1554 <sup>a</sup>
HS bolts and studs	ASTM A 449, Type 1 <sup>a</sup>
HS threaded rods	ASTM A 449, Type 1 <sup>a</sup>
HS nonheaded anchor bolts	ASTM F 1554, Grade 105, Class 2A <sup>a</sup>
Nuts	ASTM A 563, including appendix X1 <sup>b</sup>
Washers	ASTM F 844
Hardened Washers	ASTM F 436, Type 1, including S1 supplementary requirements
Components of HS steel fastener assemblies for use in structural steel joints:	
Bolts	ASTM A 325, Type 1
Tension control bolts	ASTM F 1852, Type 1
Nuts	ASTM A 563, including appendix X1 <sup>b</sup>
Hardened washers	ASTM F 436, Type 1, Circular, including S1 supplementary requirements
Direct tension indicators	ASTM F 959, Type 325, zinc-coated

<sup>a</sup>Use hardened washers.

<sup>b</sup>Zinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.

Replace the 3rd table in the 1st paragraph of section 55-1.02A(1) with:

07-19-13

<b>Other Materials</b>	
Material	Specification
Carbon steel for forgings, pins, and rollers	ASTM A 668/A 668M, Class D
Alloy steel for forgings	ASTM A 668/A 668M, Class G
Pin nuts	ASTM A 709/A 709M or ASTM A 563, including appendix X1 <sup>a</sup>
Carbon-steel castings	ASTM A 27/A 27M, Grade 65-35, Class 1
Malleable iron castings	ASTM A 47/A 47M, Grade 32510
Gray iron castings	ASTM A 48, Class 30B
Carbon steel structural tubing	ASTM A 500/A 500M, Grade B, ASTM A 501, ASTM A 847/A 847M, or ASTM A 1085
Steel pipe <sup>b</sup>	ASTM A 53, Type E or S, Grade B; ASTM A 106, Grade B; or ASTM A 139, Grade B
Stud connectors	ASTM A 108

<sup>a</sup>Zinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.

<sup>b</sup>Hydrostatic testing will not apply.

**Replace the table in the 1st paragraph in section 55-1.02A(2) with:**

07-19-13

Material complying with ASTM A 709/A 709M	CVN impact value (ft-lb at temperature)
Grade 36	15 at 40 °F
Grade 50 <sup>a</sup> (Thickness up to 2 inches)	15 at 40 °F
Grade 50W <sup>a</sup> (Thickness up to 2 inches)	15 at 40 °F
Grade 50 <sup>a</sup> (Thickness over 2 inches up to 4 inches )	20 at 40 °F
Grade 50W <sup>a</sup> (Thickness over 2 inches up to 4 inches)	20 at 40 °F
Grade HPS 50W <sup>a</sup> (Thickness up to 4 inches)	20 at 10 °F
Grade HPS 70W (Thickness up to 4 inches)	25 at -10 °F
Grade 100 (Thickness of 2-1/2 inches or less)	25 at 0 °F
Grade 100W (Thickness over 2-1/2 inches up to 4 inches)	35 at 0 °F
Grade HPS 100W (Thickness of 2-1/2 inches or less)	25 at -30 °F
Grade HPS 100W (Thickness over 2-1/2 inches up to 4 inches)	35 at -30 °F

<sup>a</sup>If the material yield strength is more than 65,000 psi, reduce the temperature for the CVN impact value 15 degrees F for each increment of 10,000 psi above 65,000 psi.

**Replace the 1st sentence of the 1st paragraph in section 55-1.02A(5) with:**

07-19-13

Steel, gray iron, and malleable iron castings must have continuous fillets cast in place in reentrant angles.

**Delete the 3rd and 4th sentences in the 2nd paragraph in section 55-1.02A(5).**

07-19-13

**Replace the 1st paragraph of section 55-1.02B(1) with:**

07-19-13

Section 55-1.02B(1) applies to work performed at the source and at the job site.

**Replace the 4th paragraph in section 55-1.02B(1) with:**

07-19-13

Ends of girder stiffeners shown as tight-fit must bear on the girder flange with at least point bearing. Local clearances between the end of the stiffener and the girder flange must be at most 1/16 inch.

**Replace the 1st sentence of the 5th paragraph in section 55-1.02B(1) with:**

07-19-13

Fabricate floor beams, stringers, and girders having end connection angles to exact length back to back of connection angles.

**Add to the 7th paragraph in section 55-1.02B(1):**

07-19-13

Use low-stress stamps for fracture critical members and tension members.

**Replace the 2nd sentence of the 9th paragraph in section 55-1.02B(1) with:**

07-19-13

Slightly round edges and sharp corners, including edges marred, cut, or roughened during handling or erection.

**Replace the 3rd paragraph in section 55-1.02B(2) with:**

07-19-13

Instead of machining, you may heat straighten steel not in contact with other metal bearing surfaces if the above tolerances are met.

**Replace item 2 in the list in the 1st paragraph of section 55-1.02B(3) with:**

07-19-13

2. Radius of bend measured to the concave face must comply with *Manual of Steel Construction* of the AISC

**Replace the 1st sentence of the 2nd paragraph in section 55-1.02B(3) with:**

07-19-13

Plates to be bent to a smaller radius than specified in *Manual of Steel Construction* of the AISC must be bent hot.

**Replace the introductory clause of the 2nd paragraph of section 55-1.02B(4) with:**

07-19-13

Threads for pin ends and pin nuts 1-1/2 inches or more in diameter must comply with the following:

**Replace the 3rd paragraph in section 55-1.02B(5) with:**

07-19-13

Holes for pins must be:

1. True to the diameter specified.
2. At right angles to the member axis.
3. Parallel with each other except for pins where nonparallel holes are required.
4. Smooth and straight with the final surface produced by a finishing cut.

**Replace the 1st paragraph in section 55-1.02B(6)(c) with:**

07-19-13

Bolted connections using HS fastener assemblies must comply with *Specification for Structural Joints Using High-Strength Bolts* of the RCSC.

**Replace the 7th paragraph in section 55-1.02B(6)(c) with:**

07-19-13

For all bolts, thread stickout after tensioning must be at least flush with the outer nut face. At least 3 full threads must be located within the grip of the connection.

07-19-13

**Delete the 3rd paragraph in section 55-1.02B(7)(a).**

**Add to section 55-1.02B(7)(a):**

07-19-13

For welds indicated to be subject to tensile forces that are to receive RT, grind smooth and flush on both sides of welds before testing.

For groove weld surface profiles that interfere with NDT procedures, grind welds smooth and blend with the adjacent material.

For fillet weld surface profiles that interfere with NDT procedures, grind welds and blend the toes smoothly with the adjacent base metal.

**Add to section 55-1.02B(7):**

07-19-13

**55-1.02B(7)(c) Steel Pedestrian Bridges**

Reserved

**Replace the 1st paragraph in section 55-1.02B(9) with:**

07-19-13

Prepare and paint contact surfaces of HS bolted connections before assembly. Thoroughly clean all other surfaces of metal in contact to bare metal before assembly. Remove all rust, mill scale, and foreign material.

**Replace the 1st sentence of the 4th paragraph in section 55-1.02B(9) with:**

07-19-13

Preassemble truss work in lengths of at least 3 abutting panels and adjust members for line and camber.

**Replace the 1st sentence of the 5th paragraph in section 55-1.02B(9) with:**

07-19-13

Preassemble bolted splice joints for plate girders in lengths of at least 3 abutting sections and adjust abutting sections for line and camber.

**Replace the 6th paragraph in section 55-1.02B(9) with:**

07-19-13

Preassemble prepared splice joints for welded girders with abutting members and adjust for line and camber.

**Replace the paragraphs in section 55-1.03C(1) with:**

07-19-13

Reserved

**Replace the 3rd sentence of the 1st paragraph in section 55-1.03C(2) with:**

07-19-13

Attain full bearing on the concrete under bearing assemblies.





## 59 PAINTING

11-15-13

**Replace "SSPC-SP 10" at each occurrence in section 59 with:**

SSPC-SP 10/NACE no. 2

10-19-12

**Replace "SSPC-SP 6" at each occurrence in section 59 with:**

SSPC-SP 6/NACE no. 3

10-19-12

**Replace "SSPC-CS 23.00" at each occurrence in section 59 with:**

SSPC-CS 23.00/AWS C 2.23M/NACE no. 12

10-19-12

**Replace "*Specification for Structural Joints Using ASTM A325 or A 490 Bolts*" in the 1st paragraph of section 59-2.01C(1) with:**

*Specification for Structural Joints Using High-Strength Bolts*

07-19-13

**Replace "SSPC-QP 3 or AISC SPE, Certification P-1 Enclosed" in item 3 in the list in the 1st paragraph of section 59-2.01D(1) with:**

AISC-420-10/SSPC-QP 3 (Enclosed Shop)

10-19-12

**Replace "*Specification for Structural Joints Using ASTM A325 or A 490 Bolts*" in the 1st paragraph of section 59-2.02 with:**

*Specification for Structural Joints Using High-Strength Bolts*

07-19-13

**Replace the paragraphs in section 59-2.03A with:**

Clean and paint all exposed structural steel and other metal surfaces.

10-19-12

You must provide enclosures for cleaning and painting structural steel. Cleaning and painting of new structural steel must be performed in an Enclosed Shop as defined in AISC-420-10/SSPC-QP 3. Maintain atmospheric conditions inside enclosures within specified limits.

Except for blast cleaning within closed buildings, perform blast cleaning and painting during daylight hours.

**Add to section 59-2.03B:**

07-19-13

### **59-2.03B(3) Containment Systems**

#### **59-2.03B(3)(a) General**

Construct containment systems when disturbing existing paint systems during bridge rehabilitation.

The containment system must be one of the following:

1. Ventilated containment system
2. Vacuum-shrouded surface preparation equipment and drapes and ground covers
3. Equivalent containment system if authorized

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

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

Containment systems over railroad property must provide the minimum clearances as specified in section 5-1.20C for the passage of railroad traffic.

### **59-2.03B(3)(b) Ventilated Containment Systems**

#### **59-2.03B(3)(b)(i) General**

If flexible framing is used, support and fasten it to (1) prevent the escape of abrasive and blast materials due to whipping from traffic or wind and (2) maintain clearances.

If the wind speed reaches 50 mph or greater, relieve the wind pressure on the containment system using an authorized method.

#### **59-2.03B(3)(b)(ii) Design Criteria**

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

For truss-type bridges, all connections of the ventilated containment system to the existing structure must be made through the deck, girder, stringer, or floor beam system. No connections are allowed that will cause bending stresses in a truss member.

The ventilated containment system must comply with section 7-1.02K(6)(e).

The minimum total design load for the ventilated containment system must consist of the sum of the dead and live vertical loads.

Dead and live loads are as follows:

1. Dead load must consist of the actual load of the ventilated containment system
2. Live loads for bridges with only spot blast cleaning work must consist of:
  - 2.1. Uniform load of at least 25 psf applied over the supported area
  - 2.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system
3. Live loads for bridges with 100 percent blast cleaning to bare metal must consist of:
  - 3.1. Uniform load of at least 45 psf, which includes 20 psf of sand load, applied over the supported area
  - 3.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system

Assumed horizontal loads do not need to be included in the design of the ventilated containment system.

Maximum allowable stresses must comply with section 48-2.01D(3)(c).

#### **59-2.03B(3)(b)(iii) Ventilation**

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

Negative air pressure must be employed within the ventilated containment system and will be verified by visual methods by observing the concave nature of the ventilated containment system 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 system must be forced into wet or dry dust collectors or bag houses.

Replace item 1 in the list in the 2nd paragraph of section 59-2.03C(1) with:

10-19-12

1. Apply a stripe coat of undercoat paint on all edges, corners, seams, crevices, interior angles, junctions of joining members, weld lines, and similar surface irregularities. The stripe coat must completely hide the surface being covered. If spot blast cleaning portions of the bridge, apply the stripe coat of undercoat paint before each undercoat and follow with the undercoat as soon as practical. If removing all existing paint from the bridge, apply the undercoat first as soon as practical and follow with the stripe coat of undercoat paint for each undercoat.

Replace the heading of section 59-2.03C(2) with:

04-19-13

**Zinc Coating System**

Add to section 59-2.03C(2)(a):

04-19-13

Coatings for new structural steel and connections between new and existing structural steel must comply with the requirements shown in the following table:

**Zinc Coating System**

Description	Coating	Dry film thickness (mils)
<b>All new surfaces:</b>		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat <sup>a</sup>	Exterior grade latex <sup>b</sup> , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14
<b>Connections to existing structural steel:<sup>c</sup></b>		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat <sup>a</sup>	Exterior grade latex <sup>b</sup> , 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14

<sup>a</sup>If no finish coats are described, a final coat of inorganic zinc primer is required.

<sup>b</sup>Exterior grade latex must comply with section 91-2.02 unless otherwise specified.

<sup>c</sup>Includes the following locations:

1. New and existing contact surfaces
2. Existing member surfaces under new HS bolt heads, nuts, or washers
3. Bare surfaces of existing steel after trimming, cutting, drilling, or reaming
4. Areas within a 4-inch radius from the point of application of heat for welding or flame cutting

Replace "*Specification for Structural Joints Using ASTM A325 or A 490 Bolts*" in the 7th paragraph of section 59-2.03C(2)(b)(i) with:

07-19-13

*Specification for Structural Joints Using High-Strength Bolts*

**Add to section 59-2.03C:**

04-19-13

**59-2.03C(3) Moisture-Cured Polyurethane Coating System**

Reserved

**59-2.03C(4) State Specification Paint Waterborne Coating System**

**59-2.03C(4)(a) General**

The State Specification PWB coating system for existing structural steel must comply with the requirements shown in the following table:

<b>State Specification PWB Coating System</b>			
Surface	Description	State Specification PWB Coating	Dry film thickness (mils)
Surfaces cleaned to bare metal <sup>a</sup> :	1st undercoat	145	2-3
	2nd undercoat	146	2-3
	1st finish coat	171	1.5-3
	2nd finish coat	172	1.5-3
	Total thickness, all coats	--	7-12
Existing painted surfaces to be topcoated:	Undercoat	146	2-3
	1st finish coat	171	1.5-3
	2nd finish coat	172	1.5-3
	Total thickness, new coats	--	5-9

<sup>a</sup>Includes locations of spot blast cleaning

**59-2.03C(4)(b) Finish Coats**

11-15-13

Reserved

**Add to section 59-5.01:**

04-19-13

Where specified, prepare and paint sign structures under sections 59-2 and 59-3.

Instead of submitting proof of the certification complying with SSPC-QP 1, you may submit documentation with the painting quality work plan showing compliance with the requirements in section 3 of SSPC-QP 1.

Instead of submitting proof of the certification complying with SSPC-QP 2, you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 4.2 through 4.4 of SSPC-QP 2, Category A.

Instead of submitting proof of the certification complying with AISC-420-10/SSPC-QP 3 (Enclosed Shop), you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 5 through 18 of AISC-420-10/SSPC-QP3.

**Replace the paragraphs of section 59-5.03 with:**

04-19-13

**59-5.03A General**

You may prepare and paint sign structures before or after erection. After erection, repair damaged paint to the satisfaction of the Engineer.

The total dry film thickness of finish coats on contact surfaces of galvanized HS bolted connections (1) must be from 1 to 4 mils and (2) may be applied in 1 application.

**59-5.03B Undercoating of Ungalvanized Surfaces**

Blast-cleaned surfaces must receive a single undercoat consisting of an inorganic zinc coating as specified in AASHTO M 300, Type I or Type II, except:

1. The first 2 sentences of section 5.6 do not apply
2. Section 5.6.1 does not apply

If you propose to use a coating that is not on the Authorized Material List, submit the required documentation specified in section 5.6 of AASHTO M 300. Allow 30 days for the Engineer's review.

#### **59-5.03C Testing of Inorganic Zinc Coating**

Perform adhesion and hardness testing no sooner than 72 hours after application of the single undercoat of inorganic zinc coating.

#### **59-5.03D Finish Coating**

The exposed area of inorganic zinc coating must receive a minimum of 2 finish coats of exterior grade latex paint.

The 1st finish coat color must match no. 24558 of FED-STD-595. The 2nd finish coat color must match no. 24491 of FED-STD-595. The total dry film thickness of the applications of the 2nd finish coat must be not less than 2 mils.

**Replace section 59-7 with:**

07-19-13

### **59-7 STAINING CONCRETE AND SHOTCRETE**

#### **59-7.01 GENERAL**

##### **59-7.01A General**

##### **59-7.01A(1) Summary**

Section 59-7.01 includes specifications for preparing and staining concrete and shotcrete surfaces using an acid stain.

##### **59-7.01A(2) Definitions**

Reserved

##### **59-7.01A(3) Submittals**

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

##### **59-7.01A(4) Quality Control and Assurance**

Reserved

##### **59-7.01B Materials**

##### **59-7.01B(1) General**

Reserved

##### **59-7.01B(2) Stain**

Stain must:

1. Be a water-based solution of inorganic metallic salts
2. Contain dilute acid that penetrates and etches the concrete or shotcrete surface
3. Be a commercial quality product designed specifically for exterior applications
4. Produce abrasion-resistant color deposits

##### **59-7.01B(3) Sealer**

Reserved

##### **59-7.01B(4) Joint Sealing Compound**

Reserved

### **59-7.01C Construction**

#### **59-7.01C(1) General**

Seal joints between concrete and shotcrete surfaces to be stained and adjacent metal with joint sealing compound before applying the stain.

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

Apply the stain under the manufacturer's instructions.

Before staining, the concrete or shotcrete surfaces must be:

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

Apply the stain uniformly to avoid excessive rundown. Work the stain into the concrete using a nylon bristle brush in a circular motion.

After the last coat of stain has dried, rinse stained surfaces with water and wet scrub with a stiff bristle nylon brush until the rinse water runs clear. Collect all rinse water.

Protect adjacent surfaces during staining.

Thoroughly cure each application of the stain and correct skips, holidays, thin areas, or other deficiencies before the next application.

Drips, puddles, or other irregularities must be worked into the concrete or shotcrete surface.

#### **59-7.01C(2) Test Panel**

For staining concrete or shotcrete, stain a test panel complying with section 51-1.01D(3).

For staining sculpted shotcrete, stain a test panel complying with section 53-3.01D(3).

The test panel must be:

1. Stained using the same personnel, materials, equipment and methods to be used in the work
2. Accessible for viewing
3. Displayed in an upright position near the work
4. Authorized for staining before starting the staining work

If ordered, construct additional test panels until a satisfactory color is attained.

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

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

#### **59-7.01D Payment**

Not Used

### **59-7.02 SCULPTED SHOTCRETE AND TEXTURED CONCRETE**

#### **59-7.02A General**

##### **59-7.02A(1) Summary**

Section 59-7.02 includes specifications for preparing and staining sculpted shotcrete and textured concrete surfaces using an acid stain.

##### **59-7.02A(2) Definitions**

Reserved

### **59-7.02A(3) Submittals**

#### **59-7.02A(3)(a) General**

Reserved

#### **59-7.02A(3)(b) Experience Qualifications**

Submit the following documentation of the staining subcontractor's experience at least 10 days before the preconstruction meeting:

1. Summary of the staining subcontractor's experience that demonstrates compliance with section 59-7.02A(4)(b).
2. List of at least 3 projects completed in the last 5 years that demonstrate the staining subcontractor's ability to stain textured concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project. For each project include:
  - 2.1. Project description
  - 2.2. Name and phone number of the owner
  - 2.3. Staining completion date
  - 2.4. Color photos of the completed stained surface

#### **59-7.02A(3)(c) Installation Plan**

Submit an installation plan at least 10 days before the preconstruction meeting. The installation plan must include details for preparing and staining the textured concrete or sculpted shotcrete to achieve the required color, including:

1. Number of applications that will be used to apply the stain
2. For each application of the stain, a description of:
  - 2.1. Manufacturer, color, finish, and percentage strength mixture of the stain that will be applied
  - 2.2. Methods and tools that will be used to apply the stain
3. Methods for protecting adjacent surfaces during staining
4. Rinse water collection plan for containing all liquid, effluent, and residue resulting from preparing and staining textured concrete or sculpted shotcrete

### **59-7.02A(4) Quality Control and Assurance**

#### **59-7.02A(4)(a) General**

Reserved

#### **59-7.02A(4)(b) Contractor Qualifications**

The staining subcontractor must:

1. Have experience in staining textured concrete or sculpted shotcrete surfaces to simulate the appearance of natural rock formations or stone masonry
2. Have successfully completed at least 3 projects in the past 5 years involving staining of concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project

#### **59-7.02A(4)(c) Preconstruction Meeting**

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

### **59-7.02B Materials**

Not Used

### **59-7.02C Construction**

Not Used

### **59-7.02D Payment**

Prepare and stain concrete and prepare and stain shotcrete are measured by the area of the vertical or sloped wall face stained.

Replace "solider" in the 5th paragraph of section 59-9.03 with:

04-19-13

soldier

Replace section 59-11 with:

07-19-13

**59-11 STAINING GALVANIZED SURFACES**

Reserved

Replace section 59-12 with:

07-19-13

**59-12 ROCK STAINING**

**59-12.01 GENERAL**

**59-12.01A Summary**

Section 59-12 includes specifications for applying stain to the exterior surface of landscape boulders, native rock that has been damaged or scarred, rock energy dissipaters, rock slope protection and gabion surfaces.

**59-12.01B Submittals**

Submit the following:

1. Work plan showing methods to control overspray and spillage, and to protect adjacent surfaces
2. Product data including the manufacturer's product sheet and the instructions for the application of the stain

**59-12.01C Quality Control and Assurance**

**59-12.01C(1) General**

Reserved

**59-12.01C(2) Test Plot**

Apply the stain to a test plot rock area of at least 3 by 3 feet at a location designated by the Engineer. Notify the Engineer at least 7 days before staining the test plot. Prepare and stain the test plot with the same materials, tools, equipment, and methods to be used in staining the final surfaces. Separate test plots are required for staining rock slope protection and native rock.

If ordered, prepare additional test plots. Additional test plots are change order work.

Obtain authorization of the test plot before starting the staining work. Use the authorized test plot as the standard for comparison in determining acceptability of staining. If the test plot is not incorporated into the work and the Engineer determines it is no longer needed, dispose of it.

**59-12.02 MATERIALS**

**59-12.02A General**

Reserved

**59-12.02B Stain**

Reserved

**59-12.03 CONSTRUCTION**

**59-12.03A General**

Reserved

**59-12.03B Preparation**

Before applying the stain:



AA

**65 CONCRETE PIPE**

07-19-13

**Replace the 2nd paragraph of section 65-1.01 with:**

10-19-12

Concrete pipe includes all necessary elbows, wyes, tees, other branches, concrete collars or tees, and reinforcement.

**Replace section 65-2.02D with:**

07-19-13

**65-2.02D Reserved**

AA

**70 MISCELLANEOUS DRAINAGE FACILITIES**

07-19-13

**Replace section 70-5.02A(2) with:**

01-20-12

**70-5.02A(2) Plastic Flared End Sections**

Plastic flared end sections must comply with ASTM D 3350.

**Replace "40-1.03N" in item 2.4 of the 1st paragraph of section 70-5.06C with:**

07-19-13

40-1.03K

**Replace the 2nd, 3rd, and 4th paragraphs of section 70-7.02B with:**

01-18-13

Before shipping, the exterior surfaces of the casing must be cleaned, primed, and coated to comply with ANSI/AWWA C213 or ANSI/AWWA C214.

Wrapping tape for repairing damaged coating and wrapping field joints and fittings must be a pressure-sensitive PVC or polyethylene tape with a minimum thickness of 50 mils, 2 inches wide.

**Add to section 70-7.03:**

01-18-13

Repair damaged coating on the casing and wrap field joints and fittings with wrapping tape as follows:

1. Before wrapping, thoroughly clean and prime the pipe casing, joints, and fittings under the tape manufacturer's instructions.
2. Wrap the tape tightly with 1/2 uniform lap, free from wrinkles and voids to provide not less than a 100-mil thickness.
3. Wrapping at joints must extend at least 6 inches over adjacent pipe casing coverings. Apply tension such that the tape will conform closely to contours of the joint.















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

**electrolier:** Assembly of a lighting standard and luminaire.

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

**flashing beacon control assembly:** Assembly of switches, circuit breakers, terminal blocks, flasher, wiring, and other necessary electrical components housed in a single enclosure for operating a beacon.

**inductive loop detector:** Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop.

**lighting standard:** Pole and mast arm supporting the luminaire.

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

**magnetic detector:** Detector capable of being actuated by an induced voltage caused by a vehicle passing through the earth's magnetic field.

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

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

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

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

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

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

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

**signal standard:** Pole and mast arm supporting 1 or more signal faces with or without a luminaire mast arm.

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

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

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

**Replace the paragraphs in section 86-1.02 with:**

07-19-13

Comply with 8 CA Code of Regs § 2299 et seq.

Electrical equipment must comply with one or more of the following standards:

1. ANSI
2. ASTM
3. EIA
4. NEMA
5. NETA
6. UL
7. Public Utilities Commission, General Order No. 95, "Rules for Overhead Electrical Sign Construction"
8. Public Utilities Commission, General Order No. 128, "Rules for Construction of Underground Electric Supply and Communication Systems"

Materials and workmanship must comply with:

1. FCC rules

2. ITE standards
3. NEC
4. California Electrical Code

Electrical equipment and materials must be NRTL certified wherever applicable.

**Replace the paragraphs in section 86-1.03 with:**

07-19-13

Submit a schedule of values within 15 days after Contract approval.

Determine the quantities required to complete the work. Submit the quantities as part of the schedule of values.

Provide a schedule of values for each lump sum bid item.

Do not include costs for the traffic control system in the schedule of values.

The schedule of values must include the type, size, and installation method for:

1. Foundations
2. Standards and poles
3. Conduit
4. Pull boxes
5. Conductors and cables
6. Service equipment enclosures
7. Telephone demarcation cabinets
8. Vehicle signal heads and hardware
9. Pedestrian signal heads and hardware
10. Push buttons
11. Loop detectors
12. Luminaires and lighting fixtures
13. Materials shown in the quantity tables on plan sheets labeled *E*

**Replace the paragraphs in section 86-1.04 with:**

07-19-13

Within 15 days of Contract approval, submit a list of equipment and materials that you propose to install. Submit the list before shipping equipment or materials to the job site. The list must include the following information:

1. Manufacturer's name
2. Make and model number
3. Month and year of manufacture
4. Lot and serial numbers
5. Dimensions
6. List of components
7. Manufacturer's installation instructions
8. Contract number
9. Your contact information

Supplement the list with 2 copies of the following data:

1. Schematic wiring diagrams
2. Scale drawings of cabinets showing location and spacing of shelves, terminal blocks, and equipment, including dimensions
3. Operation manual

Electrical equipment constructed as shown does not require detailed drawings and diagrams.

Submit 3 sets of computer-generated schematic wiring diagrams for the cabinet.

Place the schematic wiring diagram in a heavy-duty plastic envelope and attach it to the inside of the cabinet door.

Prepare diagrams, plans, and drawings using graphic symbols in IEEE 315, "Graphic Symbols for Electrical and Electronic Diagrams."

**Replace the 5th paragraph of section 86-2.04B(2) with:**

07-19-13

HS bolts, nuts, and flat washers used to connect slip base plates must comply with the requirements for HS fastener assemblies for use in structural steel joints in section 55-1.02A(1) except rotational capacity testing and tension testing are not required.

07-19-13

**Delete the row for standard Type 36-20A in the table in the 6th paragraph of section 86-2.04B(2).**

**Replace the 10th paragraph of section 86-2.04B(2) with:**

07-19-13

Bolted connections attaching signal or luminaire arm to the pole must be considered slip critical. Galvanized faying surfaces of plates on luminaire arm, signal arm, and pole must be roughened by hand using a wire brush before assembly and must comply with requirements for Class C surface conditions for slip-critical connections in *Specification for Structural Joints Using High-Strength Bolts* of the RCSC. Coatings for faying surfaces must comply with the RCSC specification for Class B coatings.

**Replace the 1st sentence of item 8 in the list in the 1st paragraph of section 86-2.04B(3) with:**

07-19-13

During manufacturing, longitudinal seams on vertical tubular members of cantilevered support structures must be within 90 degrees circumferentially of the center of the longest mast arm connection.

07-19-13

**Delete item 15.3 in the list in the 1st paragraph of section 86-2.04B(3).**

**Add between "Exposed" and "conduit" in the 2nd paragraph of section 86-2.05B:**

07-19-13

Type 1

**Replace the 1st sentence of the 10th paragraph of section 86-2.05C with:**

07-19-13

After installing conduit, install the pull tape.

**Replace the 1st sentence of the 15th paragraph of section 86-2.05C with:**

11-15-13

Conduit runs shown to be located behind curbs may be installed in the street within 3 feet of and parallel to the face of the curb by the trenching in pavement method.

**Replace the 1st and 2nd sentences of the 2nd paragraph of section 86-2.05D with:**

07-19-13

Install an expansion-deflection fitting for expansion joints with a 1-1/2-inch movement rating. The fitting must be watertight and include a molded neoprene sleeve, a bonding jumper, and 2 silicon bronze or zinc-plated iron hubs.

**Replace section 86-2.06 with:**

07-19-13

**86-2.06 PULL BOXES**

**86-2.06A General**

**86-2.06A(1) Cover Marking**

The cover marking must be clearly defined, uniform in depth, and parallel to either the long or short sides of the cover.

Marking letters must be 1 to 3 inches high.

Before galvanizing steel or cast iron cover, apply marking by one of the following methods:

1. Use cast iron strip at least 1/4 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover with 1/4-inch flathead stainless steel machine bolts and nuts. Peen bolts after tightening.
2. Use sheet steel strip at least 0.027 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover by spot welding, tack welding, or brazing, with 1/4-inch stainless steel rivets or 1/4-inch roundhead stainless steel machine bolts and nuts. Peen bolts after tightening.
3. Bead weld the letters on cover such that the letters are raised a minimum of 3/32 inch.

**86-2.06A(2) Installation and Use**

Space pull boxes no more than 200 feet apart. You may install additional pull boxes to facilitate the work.

You may use a larger standard size pull box than that shown on the plans or specified.

A pull box in ground or sidewalk area must be installed as follows:

1. Embed bottom of the pull box in crushed rock.
2. Place a layer of roofing paper on the crushed rock.
3. Place grout over the layer of roofing paper. Grout must be 0.50 to 1 inch thick and sloped toward the drain hole.
4. Make a 1-inch drain hole in the center of the pull box through the grout and roofing paper.
5. Place grout between the pull box and the pull box extension, and around conduits.

The top of the pull box must be flush with the surrounding grade or the top of an adjacent curb, except in unpaved areas where the pull box is not immediately adjacent to and protected by a concrete foundation, pole, or other protective construction. Place the pull box 1-1/4 inches above the surrounding grade. Where practical, place a pull box shown in the vicinity of curbs or adjacent to a standard on the side of the foundation facing away from traffic. If a pull box is installed in a sidewalk area, adjust the depth of the pull box so that the top of the pull box is flush with the sidewalk.

Reconstruct the sump of an existing pull box if disturbed by your activities. Remove old grout and replace with new if the sump was grouted.

**86-2.06B Non-Traffic Pull Boxes**

Reserved

**86-2.06C Traffic Pull Boxes**

The traffic pull box and cover must comply with ASTM C857, "Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures," for HS20 loading. You must be able to place the load anywhere on the box and cover for 1 minute without causing cracks or permanent deformations.

Frame must be anchored to the box with 1/4 by 2-1/4 inch concrete anchors. Four concrete anchors must be included for No. 3-1/2(T) pull box; one placed in each corner. Six concrete anchors must be included for No. 5(T) and No. 6(T) pull boxes; one placed in each corner and one near the middle of each of the longer sides.

Nuts must be zinc-plated carbon steel, vibration resistant, and have a wedge ramp at the root of the thread.

After installation of traffic pull box, install the steel cover and keep it bolted down when your activities are not in progress at the pull box. When the steel cover is placed for the final time, the cover and Z bar frame must be cleaned of debris and tightened securely.

Steel cover must be countersunk approximately 1/4 inch to accommodate the bolt head. When tightened, the bolt head must not exceed more than 1/8 inch above the top of the cover.

Concrete placed around and under traffic pull boxes must be minor concrete.

**Replace the 11th row in the table in the 1st paragraph of section 86-2.08B with:**

07-19-13

Grounded circuit conductor	Pedestrian push buttons	Wht	Blk	NBR	14
	Signals and multiple lighting	Wht	None	NBR	10
	Flashing beacons and sign lighting	Wht	None	NBR	12
	Lighting control	Wht	None	C-3	14
	Service	Wht	None	NBR	14

**Replace the 1st sentence of the 1st paragraph of section 86-2.08C with:**

07-19-13

Circuit conductors, connectors, and terminals must be UL or NRTL listed and rated for 600 V(ac) operation.

**Add to the beginning of section 86-2.09A:**

07-19-13

Provide enough traffic signal light conductors for functional operation of the signal. Provide 3 spare conductors in all conduits containing traffic signal light conductors.

**Replace the paragraphs in section 86-2.09C with:**

07-19-13

Connectors must be crimp type. Use a manufacturer-recommended tool for connectors and terminals to join conductors. Comply with SAE-AS7928.

Terminate stranded conductors smaller than no. 14 in crimp style terminal lugs.

Terminate field conductors no. 12 and smaller with spade type terminals. Terminate field conductors no. 10 and larger with spade type or ring type terminals.

**Replace the value for resistivity in the table in the 6th paragraph of section 86-2.09E with:**

07-19-13

25 x 10<sup>13</sup> Ω per inch, minimum

**Add between "the" and "head" in the 3rd sentence of the 2nd paragraph of 86-2.09F:**

connector

07-19-13

**Replace "project" in the 3rd paragraph of section 86-2.11A with:**

work

10-19-12

**Replace "Contract" in item 2 in the list in the 11th paragraph of section 86-2.11A with:**

work

10-19-12

**Delete the 12th paragraph of section 86-2.11A.**

07-19-13

**Replace section 86-2.11C with:**

07-19-13

**86-2.11C Electrical Service for Booster Pumps**

Provide electrical service from the service point to the booster pump.

Furnish conductors, conduit, and pull boxes from the service point to the booster pump.

Do not use Type 3 conduit unless shown otherwise.

**Replace section 86-2.14A with:**

07-19-13

**86-2.14A General**

Deliver material and equipment for acceptance testing to either METS or a testing location as ordered.

Allow 30 days for testing. The Department notifies you when testing is complete. You must pick up the material or equipment from the test site and deliver it to the job site.

If material or equipment is rejected, allow 30 days for retesting. The retesting period starts when replacement material or equipment is delivered to the test site.

If material or equipment submitted for testing does not comply with the specifications, remove it within 5 business days after you are notified that the equipment is rejected. If equipment is not removed within that period, the Department may ship it to you and deduct the shipping cost.

Testing and quality control procedures for traffic signal controller assemblies must comply with NEMA TS standards for traffic control systems.

**Replace the 2nd paragraph of section 86-3.02A(1) with:**

The Department furnishes the BBS components under section 6-2.03.

07-19-13

**Replace the 9th paragraph of section 86-3.02B with:**

07-19-13

The couplings between the external cabinet and Model 332L cabinet must include a conduit for power connections between the 2 cabinets. Couplings must include:

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

**Delete item 1.3 in the list in the 7th paragraph of section 86-3.04A.**

07-19-13

**Replace the 2nd paragraph of section 86-4.01A with:**

07-19-13

The housing must not fail structurally as described in the following table:

**Housing Structural Failure**

Housing type	Test method	Description of structural failure
Metal	California Test 666	Fracture within the housing assembly or deflection of more than half the lens diameter of the signal section during the wind load test
Plastic	California Test 605	Fracture within the housing assembly or deflection of more than 10 degrees in either the vertical or horizontal plane after the wind load has been removed from the front of the signal face or deflection of more than 6 degrees in either the vertical or horizontal plane after the wind load has been removed from the back of the signal face

**Replace the 1st sentence of section 86-4.01A(1) with:**

07-19-13

Each metal housing must have a metal visor.

**Replace the 1st sentence of section 86-4.01A(2) with:**

07-19-13

Each plastic housing must be molded in 1 piece or fabricated from 2 or more pieces and joined into a single piece.

**Delete item 1 in the list in section 86-4.01D(1)(b).**

07-19-13

**Replace the paragraphs in section 86-4.01D(1)(c)(i) with:**

07-19-13

LED signal modules must be on the Authorized Material List for LED traffic signals.

The Department tests modules under section 86-2.14A, ANSI/ASQ Z1.4, and:

1. California Test 604 for LED and circular LED signal modules
2. California Test 3001 for arrow, U-turn, and bicycle LED signal modules

The LED signal modules submitted for testing must be typical production units. LEDs must be spread evenly across the module.

The Department may test the modules on all parameters specified in section 86-4.01D.

**Replace the 1st and 2nd sentences of the 3rd paragraph of 86-4.01D(2)(b) with:**

The electrical connection for each flashing LED signal module must be 4 secured, color-coded, jacketed copper wires. The wire must comply with the NEC. 07-19-13

**Replace the heading of section 86-4.02 with:**

**PROGRAMMED VISIBILITY VEHICLE SIGNAL SECTION**

07-19-13

**Replace "face" in the 1st paragraph of section 86-4.02 with:**

section

07-19-13

**Add before the 1st sentence in section 86-4.03A:**

The pedestrian signal face must be Type A.

07-19-13

**Replace the 1st sentence of the 2nd paragraph of section 86-4.03B with:**

The Department tests the pedestrian signal's front screen in a horizontal position with its edges supported.

07-19-13

**Delete items 1 and 4 in the list in section 86-4.03I(1)(b).**

07-19-13

**Replace the paragraphs of section 86-4.03I(1)(c)(i) with:**

The LED PSF module must be on the Authorized Material List for LED traffic signals.

The Department tests LED PSF modules under section 86-2.14A, ANSI/ASQ Z1.4, and California Test 606.

The LED PSF modules submitted for testing must be representative of typical production units.

The Department may test the modules on all parameters specified in section 86-4.03I.

07-19-13

**Replace item 1 in the list in the 1st paragraph of section 86-4.03I(2) with:**

1. Not include reflectors.

07-19-13

Replace item 6 in the list in the 1st paragraph of section 86-4.03I(2) with:

07-19-13

6. Be able to replace signal lamp optical units and pedestrian signal faces with LEDs.

Replace the table titled "Chromaticity Standards (CIE Chart)" in the 16th paragraph of section 86-4.03I(2) with:

07-19-13

**Chromaticity Standards (CIE Chart)**

Upraised hand	X: not greater than 0.659 or less than 0.600 Y: not greater than 0.390 or less than 0.331 Y= 0.990-X
Walking person	X: not greater than 0.440 or less than 0.280 Y: not greater than 0.0483 + 0.7917(X) or less than 0.0983 + 0.7917(X)

Add between "beacon" and "must" in the 1st sentence of section 86-4.05:

07-19-13

signal face

Delete "face" in item 1 in the list in the 1st paragraph of section 86-4.05.

07-19-13

Replace the row for viscosity in the table in the 2nd paragraph of section 86-5.01A(3)(c) with:

07-19-13

Viscosity, Brookfield Thermosel, no. 27 Spindle, 20 rpm, 190 °C	D 4402	2.5–3.5 Pa·s
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Replace the paragraph in section 86-5.01A(3)(d) with:

07-19-13

Use epoxy sealant for repair work in and around sawcuts housing inductive loops.

Replace "all loop conductors" in the 3rd paragraph of section 86-5.01A(4) with:

07-19-13

the detector lead-in cable

Replace "Encase the loop wires" in the 1st sentence of the 3rd paragraph of section 86-5.01A(5) with:

07-19-13

The loop wires must be encased



Replace the row for hydraulic bursting strength in the table in the 2nd paragraph of section 88-1.02B with:

10-19-12

Puncture strength, lb min	ASTM D 6241	310
Trapezoid tearing strength, lb min	ASTM D 4533	56

Replace the 3rd paragraph in section 88-1.02C with:

10-19-12

Geocomposite wall drain must be from 0.25 to 2 inches thick.

Replace the value for permittivity of woven fabric in the table in the 1st paragraph of section 88-1.02E with:

01-20-12

0.05

Replace the value for apparent size opening of nonwoven fabric in the table in the 1st paragraph of section 88-1.02E with:

01-20-12

0.012

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 <sup>-1</sup> 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 <sup>-1</sup> 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

Replace section 88-1.02P with:

01-18-13

**88-1.02P Biaxial Geogrid**

Geosynthetics used for biaxial geogrid must be a punched and drawn polypropylene material formed into an integrally formed biaxial grid. When tested under the referenced test methods, properties of biaxial geogrid must have the values shown in the following table:

**Biaxial Geogrid**

Property	Test	Value
Aperture size, inch <sup>a</sup> min and max	Calipered	0.8-1.3 x 1.0-1.6
Rib thickness, inch min	Calipered	0.04
Junction thickness, inch min	Calipered	0.150
Tensile strength, 2% strain, lb/ft <sup>a</sup> min	ASTM D 6637	410 x 620
Tensile strength at ultimate, lb/ft <sup>a</sup> min	ASTM D 6637	1,310 x 1,970
Ultraviolet resistance, percent min retained tensile strength, 500 hours	ASTM D 4355	100
Junction strength, lb/ft <sup>a</sup> min	ASTM D 7737	1,220 x 1,830
Overall flexural rigidity, mg-cm min	ASTM D 7748	750,000
Torsional rigidity at 20 cm-kg, mm-kg/deg <sup>b</sup> min	GRI:GG9	0.65

<sup>a</sup>Machine direction x cross direction

<sup>b</sup>Geosynthetic Research Institute, Test Method GG9, *Torsional Behavior of Bidirectional Geogrids When Subjected to In-Plane Rotation*



**Replace the paragraphs in section 90-4.01C with:**

07-19-13

**90-4.01C(1) General**

For reports and logs, type or clearly print the name next to the signature of the person signing the report or log.

Submit expansion test data under section 90-4.02, if required.

**90-4.01C(2) Certificates of Compliance**

Submit a certificate of compliance for the cementitious material used in PC concrete members. The certificate must be signed by the PC concrete product manufacturer.

Submit a certificate of compliance for each PC concrete member. The certificate of compliance for tier 1 and tier 2 members must be signed by the QC manager. The certificate of compliance for tier 3 members must be signed by the QC Inspector.

**90-4.01C(3) Precast Concrete Quality Control Plan**

Before performing any precasting activities for tier 1 and tier 2 PC concrete members, submit 3 copies of the project-specific QC plan for the PC plant. The QC plan must supplement the information from the authorized facility audit. Submit a separate QC plan for each plant. Allow 25 days for review.

Each project-specific QC plan must include:

1. Name of the precasting plant, concrete plants, and any testing laboratory to be used.
2. Manual prepared by the precasting plant that includes:
  - 2.1. Equipment description
  - 2.2. Testing procedures
  - 2.3. Safety plan
  - 2.4. Personnel names, qualifications, and copies of certifications
3. QC manager and QC inspector names, qualifications, and copies of certifications.
4. Organizational chart showing QC personnel and their assigned QC responsibilities.
5. Methods and frequencies for performing QC procedures including inspections, material testing, and any survey performed for all components of PC concrete members. Components include prestressing, concrete, grout, reinforcement, steel, miscellaneous metal, and formwork.
6. System for reporting noncompliant PC concrete members to the Engineer.
7. System for identification and tracking repairs and repair methods.
8. Procedure for the reinspection of repaired PC concrete members.
9. Forms for certificates of compliance, daily production logs, and daily reports.

Submit a revised QC plan for any changes to:

1. Concrete plants
2. Material sources
3. Material testing procedures
4. Testing laboratory
5. Procedures and equipment
6. Updated systems for tracking and identifying PC concrete members
7. QC personnel

After authorization, submit 7 copies of each authorized QC plan and make 1 copy available at each location where work is performed.

Allow 7 days for review of a revised QC plan.

**90-4.01C(4) Daily Production Log**

The QC inspector must provide reports to the QC manager for each day that precasting activities are performed.

The QC manager must maintain a daily production log of PC activities for each day's precasting. PC activities include setting forms, placing reinforcement, setting prestressing steel, casting, curing, post

tensioning, and form release. This daily log must be available at the precasting plant. The daily log must include:

1. Plant location
2. Specific description of casting or related activities
3. Any problems or deficiencies discovered
4. Any testing or repair work performed
5. Names of QC inspectors and the specific QC inspections they performed that day
6. Reports for that day's precasting activities from each QC inspector including before, during, and after precast inspections

Immediately notify the Engineer when any precasting problems or deficiencies are discovered, and submit the proposed repair or process changes necessary to correct them.

#### **90-4.01C(5) Precast Concrete Report**

Before shipping PC concrete members, submit a PC concrete report. The report must include:

1. Reports of all material tests and any survey checks
2. Documentation that:
  - 2.1. You have evaluated all tests
  - 2.2. You corrected all rejected deficiencies
  - 2.3. Repairs have been reexamined with the required tests and found acceptable
3. Daily production logs
4. Certificates of compliance
5. Documentation of inspections

Each person who performs a material test or survey check must sign the corresponding report and submit the report directly to the QC manager.

**Replace the paragraphs in section 90-4.01D with:**

07-19-13

#### **90-4.01D(1) General**

Quality control and assurance for PC concrete includes:

1. Your QC program
2. Department's acceptance of PC concrete members

PC concrete members are categorized into the following 4 tiers:

1. Tier 1 consists of:
  - 1.1. Components of bridge structures, including girders, deck panels, bent caps, abutments, slabs, closure wall panels, and piling
  - 1.2. Prestressed pavement
2. Tier 2 consists of:
  - 2.1. Components of earth retaining systems
  - 2.2. Wingwalls
  - 2.3. Types A, B, and C pipe culvert headwalls, endwalls, and wingwalls
  - 2.4. Pavement
  - 2.5. Box culverts
  - 2.6. Sound wall panels and supports
3. Tier 3 consists of:
  - 3.1. Pipes
  - 3.2. Pipe drainage facilities
  - 3.3. Straight and "L" pipe culvert headwalls except those listed under tier 2
  - 3.4. Drainage Inlets
  - 3.5. Flared end sections
4. Tier 4 consists of any member not described as tier 1, tier 2, or tier 3

## **90-4.01D(2) Quality Control**

### **90-4.01D(2)(a) General**

For tier 1 and tier 2 PC concrete members:

1. Fabricate PC concrete members at a plant on the Authorized Facility Audit List
2. Assign a PC concrete QC manager to the plant
3. Assign a QC inspector who is either registered as a civil engineer in the State or:
  - 3.1. For tier 1, has a Plant Quality Personnel Level II certification from the Precast/Prestressed Concrete Institute
  - 3.2. For tier 2, has a Plant Quality Personnel Level I certification from the Precast/Prestressed Concrete Institute
4. Prepare a PC concrete QC plan
5. Perform PC concrete materials testing
6. Maintain a daily production log
7. Prepare a PC concrete report
8. Prepare a certificate of compliance

For tier 3 PC concrete members:

1. Assign a QC inspector who has one of the following qualifications:
  - 1.1. Registration as a civil engineer in the State.
  - 1.2. Plant Quality Personnel, Level I certification from the Precast/Prestressed Concrete Institute.
  - 1.3. Competency to perform inspection of PC operations. An inspector is competent if the individual has completed training or has experience in PC operations and inspection.
2. Prepare a certificate of compliance

For tier 4 PC concrete members, prepare a certificate of compliance.

For each ASTM test method specified in this section, the material's test result must comply with the requirement specified for the comparable test in section 90 unless otherwise specified.

If curing compound is used, provide certificate of compliance as specified in section 90-1.01C(5).

If PC concrete is manufactured at an established PC concrete plant, a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures under section 90-1.01D(5)(b) are not required.

### **90-4.01D(2)(b) Quality Control Meeting**

After submitting the PC concrete QC plan, hold a meeting to discuss the requirements for PC concrete QC. The meeting attendees must include the Engineer, the PC concrete QC manager, and a representative from each plant performing PC concrete activities for the Contract.

### **90-4.01D(2)(c) Sampling, Testing, and Inspecting**

The QC laboratory testing personnel or the QC inspector must witness sampling. The QC laboratory testing personnel must perform testing.

QC laboratory testing personnel must have the following certifications, as applicable:

1. ACI Strength Testing Technician
2. ACI Concrete Laboratory Testing Technician Level 1
3. ACI Aggregate Testing Technician Level 2

The QC Inspector must perform inspections before, during, and after casting is complete.

QC field testing and inspection personnel must have an ACI Concrete Field Testing Technician, Grade I certification.

For each mix design used for tier 1 and tier 2 PC concrete members, perform sampling and testing at the minimum frequencies shown in the following tables:

### Aggregate QC Tests

Property	Test method	Minimum testing frequency
Aggregate gradation	ASTM C136	Once per 400 cu yd of concrete cast or once a week, whichever is more frequent
Sand equivalent	ASTM D2419	
Percent fines under 75 microns <sup>a</sup>	ASTM C117	
Moisture content of fine aggregate	ASTM C566, or electronically actuated moisture meter <sup>b</sup>	1–2 times per each day of pour, depending on conditions

<sup>a</sup>Percent fines under 75 microns test replaces the cleanness test in section 90-1.02C with the requirements of 1.5 percent maximum for "Operating Range" and 2.0 percent maximum for "Contract Compliance." The 5th paragraph of section 90-1.02C(2) does not apply.

<sup>b</sup>Electronically actuated moisture meter must be calibrated once per week per ASTM C566.

### Concrete QC Tests

Property	Test method	Minimum testing frequency
Compressive strength <sup>b</sup>	ASTM C172/C172M, ASTM C31/C31M, and ASTM C39/C39M	Once per 100 cu yd of concrete cast, or every day of casting, whichever is more frequent
Slump	ASTM C143/C143M	
Temperature	ASTM C1064/C1064M	
Density	ASTM C138	Once per 600 cu yd of concrete cast or each week of batching, whichever is more frequent
Air content	ASTM C231/C231M or ASTM C173/C173M <sup>a</sup>	If concrete is air entrained, once for each set of cylinders, and when conditions warrant

<sup>a</sup>ASTM C173/C173M must be used for lightweight concrete.

<sup>b</sup>Cylinders must be 6 by 12 inches.

If concrete is batched at more than 1 plant, perform the tests at each plant.

Cure test cylinders for determining time of prestressing loading in the same manner as the concrete in the member.

Cure test cylinders for determining compliance with 28-day strength requirements in the same manner as the member until completion of the steam curing process followed by a water bath or moist room at 60 to 80 degrees F until tested.



## 92 ASPHALTS

07-19-13

Replace "Reserved" in section 92-1.01B with:

07-19-13

**modified asphalt binder:** Asphalt binder modified with polymers, crumb rubber, or both.

Replace the row for dynamic shear for original binder in the table in the 1st paragraph of section 92-1.02B with:

01-20-12

Dynamic shear, Test temperature at 10 rad/s, °C	T 315	58	64	64	64	70
min $G^*/\sin(\delta)$ , kPa		1.00	1.00	1.00	1.00	1.00
max $G^*/\sin(\delta)$ , kPa		2.00	2.00	2.00	2.00	2.00

**Replace 2nd paragraph of section 92-1.02B with:**

07-19-13

PG modified asphalt binder must comply with the requirements shown in the following table:

**PG Modified Asphalt Binder**

Property	AASHTO Test Method	Grade		
		PG 58-34 M	PG 64-28 M	PG 76-22 M
<b>Original Binder</b>				
Flash point, min °C	T 48	230	230	230
Solubility, min %	T 44 <sup>a</sup>	97.5	97.5	97.5 <sup>b</sup>
Viscosity at 135 °C <sup>c</sup> , max, Pa·s	T 316	3.0	3.0	3.0
Dynamic shear, Test temperature at 10 rad/s, °C min G*/sin(delta), kPa	T 315	58 1.00	64 1.00	76 1.00
RTFO test <sup>d</sup> , Mass loss, max, %	T 240	1.00	1.00	1.00
<b>RTFO Test Aged Binder</b>				
Dynamic shear, Test temperature at 10 rad/s, °C min G*/sin(delta), kPa	T 315	58 2.20	64 2.20	76 2.20
Dynamic shear, Test temperature at 10 rad/s, °C max (delta), degree	T 315	80 <sup>e</sup>	80 <sup>e</sup>	80 <sup>e</sup>
Elastic recovery <sup>f</sup> , Test temperature °C min recovery, %	T 301	25 75	25 75	25 65
PAV <sup>g</sup> , temperature, °C	R 28	100	100	110
<b>RTFO Test and PAV Aged Binder</b>				
Dynamic shear, Test temperature at 10 rad/s, °C max G*sin(delta), kPa	T 315	16 5000	22 5000	31 5000
Creep stiffness, Test temperature, °C max S-value, MPa min M-value	T 313	-24 300 0.300	-18 300 0.300	-12 300 0.300

