STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

APPLICABLE STANDARDS

BOOK 3

I-15 Cajon Pass Rehabilitation

FOR DESIGN AND CONSTRUCTION ON STATE HIGHWAY

On I-15 from 0.4 mile North of Kenwood Avenue and 0.3mile
south of West Hesperia Overhead

DISTRICT 08, ROUTE I-15

CONTRACT NO. 08-0Q7404

08-SBD-I-15 PM R15.4/R30.8

Project ID 08000204564

Federal Aid Project

Xxxxxxxx

TABLE OF CONTENTS

1 INDEX OF STANDARDS, MANUALS, GUIDELINES AND REFERENCES 1-1

2 MODIFICATIONS TO DEPARTMENT (CALTRANS) MANUALS 2-1

3 MODIFICATIONS TO TECHNICAL MEMORANDA (NOT USED) 3-1

4 DESIGN-BUILD MODIFICATIONS TO THE CALTRANS STANDARD SPECIFICATIONS 2010 EDITION 4-1

5 MODIFICATIONS TO SPECIAL PROVISIONS 5-1

1 INDEX OF STANDARDS, MANUALS, GUIDELINES AND REFERENCES

1 INDEX OF STANDARDS, MANUALS, GUIDELINES AND REFERENCES

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Ref #	Organization	Standard	Publication Year / Last Updated (Revision)	Avail-ability (E / IS / W)	√ If Appli-cable
1	AASHTO	A Guide for Accommodating Utilities within Highway Right-of-Way	4th Edition 2005	IS	√
2	AASHTO	A Guide for Achieving Flexibility in Highway Design	1st Edition 2004	IS	√
3	AASHTO	A Guide for Methods and Procedures in Contract Maintenance	2nd Edition 2002	IS	√
4	AASHTO	A Guide for the Development of Rest Areas on Major Arterials and Freeways	3rd Edition 2001	IS	
5	AASHTO	A Guide for Transportation Landscape and Environmental Design	2nd Edition 1991	IS	√
6	AASHTO	A Guide to Small Sign Support Hardware	June 1998	IS	√
7	AASHTO	A Guide to Standardized Highway Barrier Hardware	2nd Edition 1995	IS	√
8	AASHTO	A Guide to Standardized Highway Lighting Pole Hardware	April 1980	IS	√
9	AASHTO	A Manual of User Benefit Analysis for Highways	3rd Edition 2010	IS	√
10	AASHTO	A Policy on Design Standards-Interstate System	5th Edition 2005	IS	√
11	AASHTO	A Policy on Geometric Design of Highways and Streets - "The Green Book"	5th Edition 2004	IS	√
12	AASHTO	A Policy On the Accommodation Of Utilities Within Freeway Right of Way	5th Edition October 2005	IS	√
13	AASHTO	AASHTO Bridge Element Inspection Manual, 1st Edition BEM-1 BEM-1-UL	2011	IS	

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Ref #	Organization	Standard	Publication Year / Last Updated (Revision)	Avail-ability (E / IS / W)	√ If Appli-cable
14	AASHTO	AASHTO LRFD Bridge Construction Specifications, 3rd Edition, 2010 Interim Revisions	2010	IS	
15	AASHTO	AASHTO LRFD Bridge Construction Specifications, 3rd Edition, with 2010 Interim Revisions LRFDCONS-3-M	3rd Edition 2010	IS	
16	AASHTO	AASHTO LRFD Bridge Construction Specifications, 3rd Edition, with 2010 Interim Revisions, Single User Digital Publication LRFDCONS-3-UL	3rd Edition 2010	IS	
17	AASHTO	AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, 5th Edition, with 2010 Interim Revisions LRFDUS-5-M	5th Edition 2010	IS	
18	AASHTO	AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, 5th Edition, with 2010 Interim Revisions LRFDUS-5-UL	5th Edition 2010	IS	
19	AASHTO	AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, 5th Edition, 2010 Interim Revisions	2010	IS	
20	AASHTO	AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, Second Edition, Single User Digital Publication LRFDUS-2-UL	2nd Edition 1998	IS	
21	AASHTO	AASHTO LRFD Bridge Design Specifications	4th Edition 2007	IS	
22	AASHTO	AASHTO LRFD Design Examples—Horizontally Curved Steel Bridges GHC-4I1-OL	2006	IS W	
23	AASHTO	AASHTO LRFD Movable Highway Bridge Design Specifications, 2008 Interim Revisions LRFDMOV-2-I1	2008	IS	

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24	AASHTO	AASHTO LRFD Movable Highway Bridge Design Specifications, 2010 Interim Revisions LRFDMOV-2-I2-OL LRFDMOV-2-I2	2010	IS	
25	AASHTO	AASHTO LRFD Movable Highway Bridge Design Specifications, 2011 Interim Revisions LRFDMOV-2-I3-OL LRFDMOV-2-I3	2011	IS	
26	AASHTO	AASHTO LRFD Movable Highway Bridge Design Specifications, 2nd Edition, with 2008, 2010 and 2011 Interim Revisions LRFDMOV-2-M	2nd Edition 2007	IS	
27	AASHTO	AASHTO/AWS D1.5M/D1.5:2010 Bridge Welding Code, 6th Edition, AASHTO 2011Interim Revisions BWC-6-I1 BWC-6-I1-OL	2011	IS	
28	AASHTO	AASHTO/AWS D1.5M/D1.5:2010 Bridge Welding Code, 6th Edition, with 2011 AASHTO Interim Revisions BWC-6-M	6th Edition 2010	IS	
29	AASHTO	Above and Beyond	January 2008	IS W	√
30	AASHTO	An Informational Guide for a Training Program of Right-of-Way Personnel	2nd Edition 1975	IS	
31	AASHTO	Asset Management Data Collection Guide, AASHTO-AGC-ARTBA Task Force 45 Document	June 2006	IS	√
32	AASHTO	Best Practices in Context-Sensitive Solutions, 2005 Competition	2005	IS	√
33	AASHTO	Best Practices in Context-Sensitive Solutions, 2006 Competition	2006	IS	√
34	AASHTO	Best Practices in Environmental Partnering: Raising the Bar	1998	IS	√

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Ref #	Organization	Standard	Publication Year / Last Updated (Revision)	Avail-ability (E / IS / W)	√ If Appli-cable
35	AASHTO	Construction Handbook for Bridge Temporary Works, 1st Edition, 2008 Interim Revisions CHBTW-1-I1	2008	IS	
36	AASHTO	Construction Handbook for Bridge Temporary Works, 1st Edition, with 2008 Interim Revisions CHBTW-1-M	1st Edition 1995	IS	
37	AASHTO	Construction Manual for Highway Construction	4th Edition 1990	IS	√
38	AASHTO	Design Drawing Presentation Guidelines, G 1.2 - 2003	2003	IS W	√
39	AASHTO	Design Policy Archive, 1st Edition, Single-User CD-ROM	January 2004	IS	√
40	AASHTO	Driving to Success with CSS	2007	IS	√
41	AASHTO	EMS Implementation Handy Guide Number One: Making the Case for an Environmental Management System	May 2004	IS	√
42	AASHTO	EMS Implementation Handy Guide Number Two: EMS, A Bridge for Organizational Coordination and Communications	May 2004	IS	√
43	AASHTO	Environmental Successes in Transportation Project Development	2001	IS	√
44	AASHTO	Foundation Investigation Manual	2nd Edition 1978	IS	
45	AASHTO	Guidance on Sharing Freeway and Highway Rights-of-Way for Telecommunications	1997	IS	
46	AASHTO	Guide Design Specifications for Bridge Temporary Works, 1st Edition, with 2008 Interim Revisions	1st Edition 1995	IS	
47	AASHTO	Guide Design Specifications for Bridge Temporary Works, 1st Edition, with 2008 Interim Revisions GSBTW-1-M	1995	IS	

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Ref #	Organization	Standard	Publication Year / Last Updated (Revision)	Avail-ability (E / IS / W)	√ If Appli-cable
48	AASHTO	Guide Design Specifications for Bridge Temporary Works, 2008 Interim Revisions GWBTW-1-I1	2008	IS	
49	AASHTO	Guide for Commonly Recognized Structural Elements and its 2002 Interim Revisions	November 2001	IS	
50	AASHTO	Guide for Consultant Contracting	March 2008	IS	√
51	AASHTO	Guide for Contracting, Selecting, and Managing Consultants in Preconstruction Engineering	3rd Edition 1996	IS	√
52	AASHTO	Guide for Design of Pavement Structures and 1998 Supplement	1993	IS	√
53	AASHTO	Guide for Design-Build Procurement	January 2008	IS	√
54	AASHTO	Guide for High-Occupancy Vehicle (HOV) Facilities	3rd Edition 2004	IS	
55	AASHTO	Guide for Park-and-Ride Facilities	2nd Edition 2004	IS	
56	AASHTO	Guide for Pavement Friction	1st Edition 2008	IS	√
57	AASHTO	Guide for Snow and Ice Control	1999	IS	√
58	AASHTO	Guide for the Development of Bicycle Facilities	3rd Edition 1999	IS	
59	AASHTO	Guide for the Planning, Design, and Operation of Pedestrian Facilities	1st Edition 2004	IS	√
60	AASHTO	Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) of Highway Bridges, 2005 Interim LRFR-1-I1-UL LRFR-1-I1	2005	IS	
61	AASHTO	Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) of Highway Bridges, 1st Edition, with 2005 Interim Revisions LRFR-1-M-UL	2003	IS	

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62	AASHTO	Guide on Evaluation and Abatement of Traffic Noise	1993	IS	√
63	AASHTO	Guide Specification and Commentary for Vessel Collision Design of Highway Bridges	February 1991	IS	
64	AASHTO	Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges, S 8.1 - 2006	2006	IS W	
65	AASHTO	Guide Specifications - Thermal Effects in Concrete Bridge Superstructures	1st Edition 1989	IS	
66	AASHTO	Guide Specifications for Cathodic Protection of Concrete Bridge Decks	July 1994	IS	
67	AASHTO	Guide Specifications for Concrete Overlay of Pavements and Bridge Decks	1990	IS	
68	AASHTO	Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition, 2003 Interims Revisions GSCB-2-I1	2003	IS	
69	AASHTO	Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition, 2003 Interims Revisions, Single User Digital Publication GSCB-2-I1-UL	2003	IS	
70	AASHTO	Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition, with 2003 Interim Revisions GSCB-2-M	2nd Edition 1999	IS	

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71	AASHTO	Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition, with 2003 Interim Revisions, Single User Digital Publication GSCB-2-UL	2nd Edition 1999	IS	
72	AASHTO	Guide Specifications for Design of FRP Pedestrian Bridges	1st Edition 2008	IS	
73	AASHTO	Guide Specifications for Design of Pedestrian Bridges	1st Edition 1997	IS	
74	AASHTO	Guide Specifications for Fracture Critical Non-Redundant Steel Bridge Members, 2nd Edition, 1978, with 1981, 1983, 1984, 1985, and 1986 Interim Revisions	2nd Edition 1996	IS	
75	AASHTO	Guide Specifications for Geotextiles in Separate Applications	1990	IS	
76	AASHTO	Guide Specifications for Highway Bridge Fabrication with HPS 70W (HPS 485W) Steel	2nd Edition 2003	IS	
77	AASHTO	Guide Specifications for Highway Construction	9th Edition 2008	IS	√
78	AASHTO	Guide Specifications for Polymer Concrete Bridge Deck Overlays	October 1995	IS	
79	AASHTO	Guide Specifications for Polymer Modified Asphalt	February 1992	IS	√
80	AASHTO	Guide Specifications for Seismic Design of Highway Bridges	1st Edition 1983	IS	
81	AASHTO	Guide Specifications for Seismic Isolation Design, 3rd Edition GSID-3	3rd Edition 2010	IS	
82	AASHTO	Guide Specifications for Seismic Isolation Design, 3rd Edition, Single User Digital Publication GSID-3-UL	3rd Edition 2010	IS	

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83	AASHTO	Guide Specifications for Shotcrete Repair of Highway Bridges	February 1998	IS	
84	AASHTO	Guide Specifications for Strength Design of Truss Bridges (Load Factor Design)	1985	IS	
85	AASHTO	Guide Specifications for Strength Evaluation of Existing Steel and Concrete Bridges	1st Edition 1989	IS	
86	AASHTO	Guide Specifications for Structural Design of Sound Barriers, 1992 Interim	1992	IS	
87	AASHTO	Guide Specifications for Structural Design of Sound Barriers, 2002 Interim	2002	IS	
88	AASHTO	Guide Specifications for Structural Design of Sound Barriers, with 1992 and 2002 Interims	1989	IS	
89	AASHTO	Guide Specifications for the Design of Stress-Laminated Wood Decks	April 1991	IS	
90	AASHTO	Guide to Quality in Preconstruction Engineering	1st Edition 2002	IS	√
91	AASHTO	Guide to Standardized Highway Drainage Products	November 1999	IS	√
92	AASHTO	Guide to Wetland Mitigation Issues for Transportation Designers	September 1996	IS	√
93	AASHTO	Guidelines and Guide Specifications for Using Pozzolanic Stabilized Mixture (Base Course or Subbase) and Fly Ash for In-Place Subgrade Soil Modifications	1990	IS	√
94	AASHTO	Guidelines for Bridge Management Systems	1st Edition 1993	IS	
95	AASHTO	Guidelines for Design Details, G 1.4 - 2006	December 2006	IS W	√
96	AASHTO	Guidelines for Design for Constructibility, 2nd Edition, G 12.1 - 2003	2003	IS W	√

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97	AASHTO	Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)	1st Edition 2001	IS	
98	AASHTO	Guidelines for Historic Bridge Rehabilitation and Replacement	1st Edition 2008	IS	
99	AASHTO	Guidelines for Maintenance Management Systems	1st Edition 2004	IS	√
100	AASHTO	Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways	4th Edition 2001	IS	√
101	AASHTO	Guidelines for Value Engineering	3rd Edition 2010	IS	√
102	AASHTO	Hazardous Waste Guide for Project Development	1st Edition 1990	IS	√
103	AASHTO	Highway Drainage Guidelines	4th Edition 2007	IS	√
104	AASHTO	Highway Safety Design and Operations Guide	3rd Edition 1997	IS	√
105	AASHTO	Hot-Mix Asphalt Paving Handbook	2nd Edition 2000	IS	√
106	AASHTO	Implementation Manual for Quality Assurance	February 1996	IS	√
107	AASHTO	Improving the Quality of Environmental Documents	May 2006	IS	√
108	AASHTO	In Situ Soil Improvement Techniques	1st Edition 1990	IS	√
109	AASHTO	Informational Guide on Fencing Controlled Access Highways	3rd Edition 1990	IS	√
110	AASHTO	Inspectors' Guide for Shotcrete Repair of Bridges	December 1999	IS	
111	AASHTO	Maintenance Manual for Roadways and Bridges	4th Edition 2007	IS	√
112	AASHTO	Manual for Bridge Evaluation	2nd Edition 2011	IS	
113	AASHTO	Manual for Condition Evaluation of Bridges, 2nd Edition with 2001 and 2003 Interim Revisions	2nd Edition 2000	IS	
114	AASHTO	Manual for Corrosion Protection of Concrete Components in Bridges	1992	IS	

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115	AASHTO	Manual on Subsurface Investigations	1st Edition 1988	IS	√
116	AASHTO	Manual on Uniform Traffic Control Devices	2009 Edtion	IS W	√
117	AASHTO	Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice	2008	IS	√
118	AASHTO	Model Drainage Manual, CD-ROM	3rd Edition 2005	IS	√
119	AASHTO	Movable Bridge Inspection, Evaluation, and Maintenance Manual	1st Edition 1998	IS	
120	AASHTO	National Transportation Communications for ITS Protocol (NTCIP)		IS	√
121	AASHTO	National Transportation Product Evaluation Program (NTPEP)		IS	√
122	AASHTO	Partnering Handbook	2005	IS	√
123	AASHTO	Pavement Deflection Data Exchange: Technical Data Guide	1998	IS	√
124	AASHTO	Pavement Management Guide	1st Edition 2001	IS	√
125	AASHTO	Policy on Land Use and Source Control Aspects of Traffic Noise Attenuation	1980	IS	
126	AASHTO	Practitioner's Handbook #1: Maintaining a Project File and Preparing an Administrative Record for a NEPA Study	2006	IS W	√
127	AASHTO	Practitioner's Handbook #10: Using the Transportation Planning Process to Support the NEPA Process	2008	IS W	√
128	AASHTO	Practitioner's Handbook #2: Responding to Comments on an Environmental Impact Statement	2006	IS W	√
129	AASHTO	Practitioner's Handbook #3: Managing the NEPA Process for Toll Lanes and Toll Roads	2006	IS W	√

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130	AASHTO	Practitioner's Handbook #4: Tracking Compliance with Environmental Commitments/Use of Environmental Monitors	2006	IS W	√
131	AASHTO	Practitioner's Handbook #5: Utilizing Community Advisory Committees for NEPA Studies	2007	IS W	√
132	AASHTO	Practitioner's Handbook #6: Consulting under Section 106 of the National Preservation Act	2007	IS W	√
133	AASHTO	Practitioner's Handbook #7: Defining the Purpose and Need, and Determining the Range of Alternatives for Transportation Projects	2007	IS W	√
134	AASHTO	Practitioner's Handbook #8: Developing and Implementing an Environmental Management System in a State Department of Transportation	2007	IS W	√
135	AASHTO	Practitioner's Handbook #9: Using the SAFETEA-LU Environmental Review Process (23 U.S.C. § 139)	2008	IS W	√
136	AASHTO	Programmatic Agreement Toolkit CD-ROM	2005	IS	√
137	AASHTO	Provisional Standards	2011 Edition	IS	√
138	AASHTO	Quality Assurance Guide Specification, 1st Edition	1st Edition 1996	IS	√
139	AASHTO	Recommendations for the Qualification of Structural Bolting Inspectors, G 4.2 - 2006	December 2006	IS	
140	AASHTO	Report of the AASHTO Task Force on Corridor Preservation	1st Edition 1990	IS	
141	AASHTO	Report on Cold Recycling of Asphalt Pavements	1988	IS	
142	AASHTO	Right of Way and Utilities Guidelines and Best Practices	January 6, 2004	IS	√
143	AASHTO	Roadside Design Guide, 4th Edition	4th Edition 2011	IS	√

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144	AASHTO	Roadway Lighting Design Guide	October 2005	IS	√
145	AASHTO	Sample Owners Quality Assurance Manual, G 4.4 - 2006	2006	IS W	√
146	AASHTO	SDMS™ Data Structure Technical Guide	2000	IS	
147	AASHTO	Segregation—Causes and Cures for Hot-Mix Asphalt	1st Edition 1997	IS	√
148	AASHTO	Shop Detail Drawing Review/Approval Guidelines, G 1.1-2000	2000	IS W	√
149	AASHTO	Shop Detail Drawings Presentation Guidelines, G 1.3-2002	2002	IS W	√
150	AASHTO	Standard Specifications for Highway Bridges	13th Edition 1983	IS	
151	AASHTO	Standard Specifications for Highway Bridges	17th Edition 2002	IS	
152	AASHTO	Standard Specifications for Highway Bridges	2nd Edition 1935	IS	
153	AASHTO	Standard Specifications for Highway Bridges	8th Edition 1961	IS	
154	AASHTO	Standard Specifications for Highway Bridges and Incidental Structures	1st Edition 1931	IS	
155	AASHTO	Standard Specifications for Movable Highway Bridges, with 1992, 1993, and 1995 Interims	August 1988	IS	
156	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition, 2010 Interim Revisions LTS-5-I1 LTS-5-I1-UL	2010	IS	√

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157	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition, 2011 Interim Revisions LTS-5-I2 LTS-5-I2-UL	2011	IS	√
158	AASHTO	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 5th Edition, with 2010 and 2011 Interim Revisions LTS-5-M	5th Edition 2009	IS	√
159	AASHTO	Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 31st Edition, and Provisional Standards, 2011 Edition with single-user CD-ROM	31st Edition 2011	IS	√
160	AASHTO	Steel Bridge Bearing Design and Detailing Guidelines, G9.1-2004	2004	IS	
161	AASHTO	Steel Bridge Erection Guide Specification, Sample Erection Plans, S10.1-2007	2007	IS	
162	AASHTO	Steel Bridge Fabrication Guide Specification, S 2.1-2002	2002	IS	
163	AASHTO	Steel Bridge Fabrication QC/QA Guide Specification, S 4.1-2002	2002	IS	
164	AASHTO	Strategic Highway Safety Plan - A Comprehensive Plan to Substantially Reduce Vehicle-Related Fatalities and Injuries on the Nation's Highways	2005	IS	√
165	AASHTO	Taking the High Road: The Environmental and Social Contributions of America's Highway Programs	1st Edition 2001	IS	√
166	AASHTO	The Use and State-of-the-Practice of Fiber Reinforced Concrete	2001	IS	

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167	AASHTO	Uniform Vehicle Code—Millenium Edition	Millenium Edition	IS	√
168	AASHTO	Using the Environmental Management System to Meet Transportation Challenges and Opportunities. An Implementation Guide	2003	IS	√
169	AASHTO	Virtual Superpave Laboratory Interactive CD-ROM	2005	IS	
170	ACI	ACI-318-08 Building Code Requirements for Structural Concrete and Commentary (Includes Errata)	January 1, 2008	IS	√
171	ADAAG	American with Disabilities Act Accessibility Guidelines for Buildings and Facilities	September 2002	W	√
172	Aluminum Association for Alloy	Aluminum Books and Alloys Number 319.0	Various	IS	
173	American Congress on Surveying and Mapping and the American Society of Civil Engineers	Definitions of Surveying and Associated Terms	1978	IS	√
174	American Iron and Steel Institute	Handbook of Steel Drainage and Highway Construction Products	2007	W	√
175	ANSI	Illuminating Engineering Society of North America Roadway Lighting ANSI Approved	July 1, 2000	IS	√
176	ANSI	Standard for Welding Procedure and Performance Qualification	November 4, 2004	IS	√
177	API	Recommended Practice for Planning, Design, and Constructing Fixed Offshore Platforms – Load and Resistance Factor Design	July 1, 1993	IS	
178	APWA	American Public Works Association Standard Location for Utilities in Public Right of Ways	February 29, 2000	W	√

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179	APWA	Standard Location for Utilities in Public Rights of Way	1968	W	√
180	AREMA	American Railway Engineering and Maintenance of Way Association Publications	Various	W	
181	ASCE	Practical Highway Aesthetics	1977	IS	√
182	ASTM	American Society of Testing and Materials Standards	2009	IS	√
183	Bellcore / Telcordia	Document No. GR-326, Issue 04, Generic Requirements for Single-Mode Optical Fiber Connectors and Jumper Assemblies	February 2010	IS	
184	BNSF/UPRR	Guidelines For Railroad Grade Separation Projects	January 24, 2007	W	
185	California Department of Agriculture	California Noxious Weed Law, California Statutes and the current state list prohibited noxious weeds and restricted noxious weeds ("Noxious Plants of California")	October 20, 2003	W	√
186	California Environmental Protection Agency	Managing Asbestos Waste	April 2003	W	√
187	Cal-OSHA	Cal-OSHA Safety Manual		IS	√
188	Caltrans	2006 Revised Standards Plans and New Standard Plans	Various	W	√
189	Caltrans	A Summary of Prevailing Wage Requirements for Contract Analysts and Contract Managers	April 2006	E	√
190	Caltrans	A Test Plan for the Characterization and Qualification of Highway Bridge Seismic Isolation Bearing Devices	February 8, 2011	W	
191	Caltrans	A Test Plan for the Characterization and Qualification of Highway Bridge Seismic Isolator and Damping Devices	February 23, 1995	W	
192	Caltrans	Additional Calibration of Traffic Noise Prediction Models	August 27, 2003	W	√

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193	Caltrans	Asphalt Rubber Usage Guide	January 2003	E	√
194	Caltrans	Berm and Wall Options, Coding of Low Barriers, Zero Height Index, Grade Corrections, and Other Issues in Sound32/ Sound 2000 and LeqV2 Traffic Noise Prediction Programs	January 17, 2002	W	√
195	Caltrans	Bridge Computer Manual	April 4, 2007	W	
196	Caltrans	Bridge Construction Records and Procedures Manual, Volume I	June 30, 2008	W	
197	Caltrans	Bridge Construction Records and Procedures Manual, Volume II	August 1, 2008	W	
198	Caltrans	Bridge Deck Construction Manual	January 1991	W	
199	Caltrans	Bridge Design Aids	April 2005	W	
200	Caltrans	Bridge Design Details	August 12, 2007	W	
201	Caltrans	Bridge Design Practice Manual	October 25, 2007	W	
202	Caltrans	Bridge Design Specifications	November 7,2008	W	
203	Caltrans	Bridge Memo To Designers	December 17, 2007	W	
204	Caltrans	Bridge Standard Detail Sheets	August 2, 2011	W	
205	Caltrans	Bridge Structural Reference Sheets	October 27, 2006	W	
206	Caltrans	Bridge Strudl Manual	November 25, 2003	W	
207	Caltrans	CADD Users Manual	October 30, 2008	W	√
208	Caltrans	California Amendments to the AASHTO LRFD Bridge Design Specifications – Fourth Edition	September 29, 2010	W	
209	Caltrans	California Bank and Shore Rock Slope Protection, plus Appendix	3rd Edition October 2000	W	

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Ref #	Organization	Standard	Publication Year / Last Updated (Revision)	Avail-ability (E / IS / W)	√ If Appli-cable
210	Caltrans	California Code Regulations Title 24	Portions	W	√
211	Caltrans	California Foundation Manual	July 1997	E	√
212	Caltrans	California Highway Barrier Aesthetics	June 2002	E	√
213	Caltrans	California Manual on Uniform Traffic Control Devices (CA MUTCD)	2012	W	√
214	Caltrans	California Seismic Hazard Map and Report	July 1996	W	√
215	Caltrans	California Sign Chart	September 2006	W	√
216	Caltrans	California Sign Specifications	September 28, 2006	W	√
217	Caltrans	California Test Methods	Various	W	√
218	Caltrans	California Vehicle Noise Emission Levels	January 1987	W	√
219	Caltrans	Caltrans Strategic Plan 2007-2012	December 17, 2007	W	√
220	Caltrans	Changeable Message Sign Guidelines	April 2006	W	√
221	Caltrans	CHP/Caltrans Call Box and Motorist Aid Guidelines	May 1999	E	√
222	Caltrans	Code of Safe Practices for Geotechnical Drilling	October 27, 2005	W	√
223	Caltrans	Code of Safe Surveying Practices	2002	E	√
224	Caltrans	Confidentiality Agreement	October 2003	W	√
225	Caltrans	Construction Manual	September 2007	W	√
226	Caltrans	Construction Policy Bulletins	Various	W	√
227	Caltrans	Construction Procedure Directives	Various	W	√

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228	Caltrans	Construction Site Best Management Practices (BMPs) Field Manual and Troubleshooting Guide	January 2003	W	√
229	Caltrans	Construction Site Best Management Practices (BMPs) Manual	May 2004	W	√
230	Caltrans	Construction Site BMPs Details and Drawings	Various	W	√
231	Caltrans	Construction Site BMPs Fact Sheets	Various	W	√
232	Caltrans	Construction Site BMPs Symbols		W	√
233	Caltrans	Construction Site Storm Water Quality Sampling Guidance Manual	December 2003	W	√
234	Caltrans	Construction Storm Water Coordinator Guidance Manual	January 2003	W	√
235	Caltrans	Continuously Reinforced Concrete Pavement (CRCP) Design and Construction Guide	June 5, 2007	W	√
236	Caltrans	Corrosion Guidelines	September 2003	W	√
237	Caltrans	Cost Effectiveness-Public Interest Finding Guidelines	November 2006	E	√
238	Caltrans	Deputy Directives by Number	Various	E	√
239	Caltrans	Design Information Bulletin	Various	E	√
240	Caltrans	Design Memoranda	Various	E	√
241	Caltrans	Director's Policies by Number	Various	E	√
242	Caltrans	Distance Limits for Traffic Noise Prediction Models Technical Advisory, Noise TAN-02-02	April 24, 2002	W	√
243	Caltrans	Division of Construction Storm Water Management Enforcement Guidance Manual	December 2003	W	√

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244	Caltrans	Dowel Bar Retrofit - MTAG Vol. II - Rigid Pavement Preservation Chapter 6	2nd Edition January 18, 2008	W	√
245	Caltrans	Drafting and Plans Manual of Instructions	March 1996	W	√
246	Caltrans	Element Inspection	September 2000	W	√
247	Caltrans	Encroachment Permits Application Guide	January 2009	W	√
248	Caltrans	Encroachment Permits Manual	7th Edition	W	√
249	Caltrans	Encroachment Permits Utility and Tree Trimming Special Provisions	December 2008	W	√
250	Caltrans	Engineering Services General Directory	February 5, 2002	W	√
251	Caltrans	Erosion Control Toolbox		W	√
252	Caltrans	Falsework Manual	January 1988	W	
253	Caltrans	Field Guide for Construction Site Dewatering	October 2001	W	√
254	Caltrans	Field Guide to Partnering on Caltrans Projects	July 2008	W	√
255	Caltrans	Flagging Instruction Handbook	May 2007	W	√
256	Caltrans	Flexible Pavement Design Examples - New Construction	September 28, 2006	W	√
257	Caltrans	Flexible Pavement Guidance	2011	W	√
258	Caltrans	Flexible Pavement Rehabilitation Design Examples	June 2006	W	√
259	Caltrans	Flexible Pavement Rehabilitation Using Pulverization	June 2008	W	√
260	Caltrans	Fog Seal Guidelines	October 2003	W	√
261	Caltrans	Foundation Manual	November 2008	W	√
262	Caltrans	Foundation Report Preparation for Bridges	December 2009	W	

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263	Caltrans	General Guidelines for Studying the Effects of Noise Barriers on Distant Receivers	November 30, 1998	W	
264	Caltrans	Geotechnical Manual	July 2, 2010	W	√
265	Caltrans	GS Procedure: Overhead Sign Foundation Guidelines	March 1, 2006	W	√
266	Caltrans	GS Procedure: Report Titles and Guidelines	January 1, 2006	W	√
267	Caltrans	Guidance for Temporary Soil Stabilization	July 2003	W	√
268	Caltrans	Guide for Design and Construction of New Jointed Plain Concrete Pavements	January 9, 2008	W	√
269	Caltrans	Guidelines and Specifications for Trenchless Technology	July 2008	W	√
270	Caltrans	Guidelines for Preparing Geotechnical Design Reports	December 2006	W	√
271	Caltrans	Guidelines for Structures Foundation Reports	March 2006	W	
272	Caltrans	Highway Design Manual	6th Edition May 7, 2012	W	√
273	Caltrans	Highway Traffic Noise Analysis and Abatement, Policy and Guidelines	June 1995	W	√
274	Caltrans	HOV Guidelines for Planning, Design and Operations	2003	W	√
275	Caltrans	Implementation of Caltrans 2009 Seismic Design Procedures	August 6, 2009	W	
276	Caltrans	Independent Assurance Manual	July 2005	W	√
277	Caltrans	Index of California Test Methods	Portions	W	√
278	Caltrans	Jointed Plain Concrete Pavement (JPCP) Preservation and Rehabilitation Design Guide	September 18, 2008	W	√
279	Caltrans	Labor Compliance Manual	1st Edition	W	√

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280	Caltrans	Labor Surcharge and Equipment Rental Rate Information - Effective April1, 2011 through March 31, 2012	2007	W	√
281	Caltrans	Landscape Architecture PS&E Guide	January 2008	W	√
282	Caltrans	Life Cycle Cost Analysis Procedures Manual	November 2007 Updated August 2010	W	√
283	Caltrans	Local Agency Structure Representative (LASR) Guidelines	August 2008	W	√
284	Caltrans	LRFD Guidelines for the Seismic Design of Highway Bridges	November 2001	W	
285	Caltrans	Main Streets: Flexibility in Design & Operations	January 2005	W	√
286	Caltrans	Maintenance Manual	Volume 1 July 2006	W	√
287	Caltrans	Maintenance Technical Advisory Guide (TAG)	October 2003	W	√
288	Caltrans	Miscellaneous equipment rental rate book	08-01-08 03-31-09	W	√
289	Caltrans	New Product Evaluation Guidelines	June 1, 2008	W	√
290	Caltrans	Office of Specially of Funded Projects (OSFP) Information and Procedures Guide		W	√
291	Caltrans	Office of Structural Materials Practices and Procedures Manual	April 2010	W	√
292	Caltrans	Open Graded Friction Course Usage Guide	February 8, 2006	W	√
293	Caltrans	OSFP Information and Procedure Guide	July 2007	W	√
294	Caltrans	Outline of Field Construction Practices	January 2009	W	√

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295	Caltrans	Overhead and Roadside Sign Structures Reference Sheets	January 2006	W	√
296	Caltrans	Oversight Engineer Field Guidelines	June 2005	W	√
297	Caltrans	Pavement Program Website		W	√
298	Caltrans	Pavement Tapers and Transitions Guide	December 31, 2008	W	√
299	Caltrans	Pavement Technical Guidance		W	√
300	Caltrans	Pedestrian and Bicycle Facilities in California	July 2005	W	√
301	Caltrans	Plans Preparation Manual	January 2008	W	√
302	Caltrans	Plans Preparation Manual Reference EZ Guide	March 2006	W	√
303	Caltrans	Policy on High and Low Risk Underground Facilities Within Highway Rights of Way	January 1997	W	√
304	Caltrans	Pre-Qualified Products List (Pending)	Various	W	√
305	Caltrans	Prestress Manual	January 2005	W	
306	Caltrans	Project Development Procedure Manual	7th Edition	W	√
307	Caltrans	Project Development Workflow Tasks Manual	October 2004	W	√
308	Caltrans	Quality Control Manual for Hot Mix Asphalt for the Quality Control Quality Assurance Process	June 2009	W	√
309	Caltrans	Ramp Meter Design Manual	January 2000	W	
310	Caltrans	Ready to List and Construction Contract Award Guide (RTL Guide)	September 2008	W	√
311	Caltrans	Right of Way Manual		W	√
312	Caltrans	Safety Manual		W	√

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313	Caltrans	Sample Mitigation Monitoring Reporting Record (MMRR) form		W	√
314	Caltrans	Sample Permits, Agreements, and Mitigation (PAM) form [xls]		W	√
315	Caltrans	Seismic Design Criteria	2006	W	
316	Caltrans	Shoulder Backing	September 30, 2006	W	√
317	Caltrans	Signal, Lighting and Electrical Systems Design Guide	5th Edition April 2007	W	√
318	Caltrans	Soil and Rock Logging, Classification, and Presentation Manual	June 2007	W	√
319	Caltrans	Specifications for Changeable Message Sign System	February 2003	W	√
320	Caltrans	Standard Environmental Reference	November 2010	W	√
321	Caltrans	Standard Highway Signs	2004	W	√
322	Caltrans	Standard Plans 2010	2010	W	√
323	Caltrans	Standard Special Provisions	January 20, 2012	W	√
324	Caltrans	Standard Special Provisions (SSPs) Updates	February 17, 2012	W	√
325	Caltrans	Standard Specifications	2010	W	√
326	Caltrans	Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual	March 2007	W	√
327	Caltrans	Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Review Guidance Manual	December 2003	W	√
328	Caltrans	Storm Water Quality Handbook: Maintenance Staff Guide	May 2003	W	√

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329	Caltrans	Storm Water Quality Handbook: Project Planning and Design Guide	May 2007	W	√
330	Caltrans	Stormwater Management Enforcement Guidance Manual Appendices	Various	W	√
331	Caltrans	Stormwater Pollution Prevention Bulletins Web Page Only		W	√
332	Caltrans	Stormwater Pollution Prevention Related College Courses Web Page Only		W	√
333	Caltrans	Stormwater Pollution Prevention Training Courses + a video		W	√
334	Caltrans	Stormwater Quality Preparation Manual Attachments SWPPP	March 1, 2007	W	√
335	Caltrans	Stormwater Quality Templates and Samples	2007	W	√
336	Caltrans	Structural Design Electronic Procedures		W	
337	Caltrans	Structural Detailing Standards	June 2005	W	√
338	Caltrans	Structure Document Request Guidelines	October 14, 2003	W	√
339	Caltrans	Su Propiedad - Su Projecto de Transportacion		W	√
340	Caltrans	Surveys Manual	September 2006	W	√
341	Caltrans	Tack Coat Guidelines	July 2006	W	√
342	Caltrans	Technical Advisory Guide (TAG) for Bonded Wearing Course Pilot Projects	October 2003	W	
343	Caltrans	Technical Advisory Guide for Microsurfacing Pilot Projects	October 2003	W	
344	Caltrans	Technical Noise Supplement	October 1998	W	√
345	Caltrans	The Plant Setback and Spacing Guide		W	
346	Caltrans	Traffic Manual (Current)	September 26, 2006	W	√

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347	Caltrans	Traffic Noise Analysis Protocol for New Highway Construction and Highway Reconstruction Projects	October 1998	W	√
348	Caltrans	Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction and Retrofit Barrier Projects	August 14, 2006	W	√
349	Caltrans	Traffic Noise Attenuation as a Function of Ground and Vegetation	June 1995	W	
350	Caltrans	Traffic Volumes on California State Highways	2007	W	√
351	Caltrans	Transportation- and Construction-Induced Vibration Guidance Manual	June 2004	W	
352	Caltrans	Transportation Electrical Equipment Specifications (TEES)	January 5, 2007	W	√
353	Caltrans	Transportation Management Plan Guidelines	May 1, 2004	W	√
354	Caltrans	Transportation Permits Manual	November 1, 2006	W	√
355	Caltrans	Trenching and Shoring Manual	January 1990	W	√
356	Caltrans	Unified Soil Classification System		W	√
357	Caltrans	Water Pollution Control Pamphlets	January 2005	W	√
358	Caltrans	Water Pollution Control Program (WPCP) Attachments	2007	W	√
359	Caltrans	Water Pollution Control Program (WPCP) Attachments	2003	W	√
360	Caltrans	Your Property - Your Transportation Project	July 2008	W	√
361	Caltrans	Your Rights and Benefits as a Displaced Business, Farm or Nonprofit Organization Under the Uniform Relocation Assistance Program		W	

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362	Caltrans	Your Rights and Benefits as a Displacee Under the Uniform Relocation Assistance Program (Mobile Home)		W	
363	Caltrans	Your Rights and Benefits as a Displacee Under the Uniform Relocation Assistance Program Residential	2007	W	
364	CPUC	PUC General Orders, Codes, Laws, Policies, Rules of Practice & Procedure	Various	W	√
365	EIA	Electronics Industries Alliance (EIA) Standards	Various	IS	√
366	EIA/TIA Collaboration	455-171A-FOTP-171	June 1, 2001	IS	√
367	EIA/TIA Collaboration	Fiber Optic Test Procedure (FOTP) Standards	Various	IS	
368	Federal Geographic Data Committee	FGDC Geospatial Standards	Various	IS	√
369	FHWA	Advance Course on Soil Slope Stability: Volume I, Slope Stability Manual FHWA-SA-94-005	April 1994	IS	√
370	FHWA	Advance Course on Soil Slope Stability: Volume II, Slope Stability Manual FHWA-SA-94-006	April 1994	IS	√
371	FHWA	An Analysis of Factors Contributing to "Walking Along Roadway" Crashes; Research Study and Guidelines for Sidewalks and Walkways FHWA RD-01-101	February 2002	W	√
372	FHWA	BIKESAFE Bicycle Safety Guide FHWA-SA-05-006	May 2006	W	√
373	FHWA	CBEAR - Bearing Capacity Analysis of Shallow Foundations Users Manual FHWA-SA-94-034	June 1982	W	

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374	FHWA	Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications FHWA-ED-88-053	February 2003	W	√
375	FHWA	Code of Federal Regulations, Title 23 (Highways), Chapter 1, Part 752 Landscape and Roadside Development	2005	W	√
376	FHWA	Com624P – Laterally Loaded Pile Analysis Program for the Microcomputer Version 2.0 FHWA-SA-91-048	August 1993	W	√
377	FHWA	Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes FHWA-NHI-00-044	September 2000	W	√
378	FHWA	Culvert Inspection Manual FHWA-IP-86-2	July 1986		√
379	FHWA	Design and Construction of Driven Pile Foundations, Volume I FHWA-HI-97-013	November 1998	W	√
380	FHWA	Design and Construction of Driven Pile Foundations, Volumes II FHWA-HI-97-014	November 1988	W	√
381	FHWA	Design Guidance Accommodating Bicycle and Pedestrian Travel: A Recommended Approach		W	√
382	FHWA	Design Manual for Permanent Ground Anchor Walls FHWA-RD-97-130	September 1998		√
383	FHWA	Design of Urban Highway Drainage FHWA-TS-79-225	August 1979	W	√
384	FHWA	Determination of Pile Driveability and Capacity from Penetration Tests Volume I FHWA-RD-96-179	May 1997	IS	√
385	FHWA	Determination of Pile Driveability and Capacity from Penetration Tests Volume II FHWA-RD-96-180	May 1997	IS	√

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386	FHWA	Determination of Pile Driveability and Capacity from Penetration Tests Volume III FHWA-RD-96-181	May 1997	IS	
387	FHWA	Drilled and Grouted Micropiles: State of Practice Review Volume I FHWA-RD-96-016	July 1997	IS	
388	FHWA	Drilled and Grouted Micropiles: State of Practice Review Volume II FHWA-RD-96-017	July 1997	IS	
389	FHWA	Drilled and Grouted Micropiles: State of Practice Review Volume III FHWA-RD-96-018	July 1997	IS	
390	FHWA	Drilled and Grouted Micropiles: State of Practice Review Volume IV FHWA-RD-96-019	July 1997	IS	
391	FHWA	Drilled Shafts: Construction Procedures and Design Methods FHWA-IF-99-025	August 1999	W	
392	FHWA	Drilled Shafts: Construction Procedures and LRFD Design Methods FHWA-NHI-10-016	May 2010	W	
393	FHWA	Durability Analysis of Aluminized Type 2 Corrugated Metal Pipe FHWA-RD-97-140	December 1996	W	√
394	FHWA	EMBANK- A Microcomputer Program to Determine One-Dimensional Compression Due to Embankment Loads FHWA-SA-92-045	May 1993	IS	√
395	FHWA	Extrapolation of Pile Capacity From Non-Failed Load Tests FHWA-RD-99-170	December 1999	W	
396	FHWA	Flexibility in Highway Design FHWA-PD-97-062		W	√
397	FHWA	Geocomposite Drains, Volume 1 FHWA-RD-86-171	October 1986	IS	√
398	FHWA	Geocomposite Drains, Volume 2 FHWA-RD-86-172	October 1986	IS	√

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399	FHWA	Geosynthetic Design and Construction Guidelines FHWA-HI-95-038	April 1998	W	√
400	FHWA	Geosynthetic Mechanically Stabilized Earth Slopes on Firm Foundations FHWA-SA-93-025	June 1989	IS	√
401	FHWA	Geotechnical Engineering Circular No. 1 - Dynamic Compaction FHWA-SA-95-037	1995	W	√
402	FHWA	Geotechnical Engineering Circular No. 2 - Earth Retaining Systems FHWA-SA-95-037	February 1997	IS	√
403	FHWA	Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Examples, Volume 2 (ISDDC) FHWA-SA-97-077	May 1997	W	
404	FHWA	Geotechnical Engineering Circular No. 3 - Earthquake Engineering for Highways, Design Principles, Volume 1 (ISDDC) FHWA-SA-97-076	May 1997	W	
405	FHWA	Geotechnical Engineering Circular No. 5 Evaluation of Soil and Rock Properties FHWA-IF-02-034	April 2002	W	√
406	FHWA	Geotechnical Engineering Circular No. 6 - Shallow Foundations FHWA-IF-02-054	September 2002	W	√
407	FHWA	Geotechnical Engineering Circular No. 7 - Soil Nail Walls FHWA-IF-03-017	March 2003	W	√
408	FHWA	Geotechnical Engineering Circular No. 8 - Design and Construction of Continuous Flight Auger Piles	2007	W	
409	FHWA	Geotechnical Engineering Circular Number 4, Ground Anchors and Anchored Systems FHWA-IF-99-015	June 1999	W	√

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410	FHWA	Geotechnical Engineering Investigation Handbook	2nd Edition 2005	IS	√
411	FHWA	Geotechnical Instrumentation FHWA-HI-98034	October 1998	IS	√
412	FHWA	Geotechnical Publications FHWA-RD-00-167	December 2000	W	√
413	FHWA	GT-1 Guidelines for the Design of Mechanically Stabilized Earth Walls with Inextensible Reinforcements	February 2008	IS	√
414	FHWA	GT-15 - Geotechnical Differing Site Conditions FHWA-1996	May 2, 1996	W	√
415	FHWA	GT-16 Determination of Unknown Subsurface Bridge Foundations, NCHRP 21-5 Interim Report Summary FHWA-1998	December 1996	IS	
416	FHWA	Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains FHWA-TS-84-204	April 1984	W	√
417	FHWA	Guidelines for Cone Penetration Test - Performance and Design FHWA-TS-78-209	July 1977	IS	√
418	FHWA	Handbook on Design and Construction of Drilled Shafts under Lateral Load FHWA-IP-84-11	1984	IS	
419	FHWA	High-Performance Concrete (HPC) Defined for Highway Structures	April 6, 2011	W	
420	FHWA	Highway Traffic Noise Analysis and Abatement, Policy and Guidelines	June 1995	W	
421	FHWA	Highway Utility Guide FHWA-SA-93-049	June 1993	W	√
422	FHWA	Hollow Core Soil Nails State of the Practice	April 2006	W	√
423	FHWA	How to Develop a Pedestrian Safety Action Plan FHWA-SA-05-12	May 2008	W	√

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424	FHWA	Hydraulic Design Series No. 5 (HEC-5), Hydraulic Design of Highway Culverts FHWA-NHI-01-020	May 2005	W	√
425	FHWA	Hydraulic Design Series No. 9 (HEC-9), Debris Control Structures Evaluation and Countermeasures FHWA-IF-04-016	October 2005	W	√
426	FHWA	Hydraulic Design Series Number 1, Hydraulics of Bridge Waterways FHWA-EPD-86-101	March 1978	W	√
427	FHWA	Hydraulic Design Series Number 3, Design Charts for Open-Channel Flow FHWA-EPD-86-102	August 1961	W	√
428	FHWA	Hydraulic Engineering Circular Number 11 (HEC-11), Design of Riprap Revetment FHWA-IP-89-016	March 1989	W	√
429	FHWA	Hydraulic Engineering Circular Number 13 (HEC-13), Hydraulic Design of Improved Inlets for Culverts FHWA-EFD-86-109	August 1972	W	√
430	FHWA	Hydraulic Engineering Circular Number 14 (HEC-14), Hydraulic Design of Energy Dissipaters for Culverts and Channels FHWA-NHI-06-086	July 2006	W	√
431	FHWA	Hydraulic Engineering Circular Number 15 (HEC-15), Design of Roadside Channels with Flexible Linings FHWA-NHI-05-114	September 2005	W	√
432	FHWA	Hydraulic Engineering Circular Number 17 (HEC-17), The Design of Encroachments on Flood Plains Using Risk Analysis FHWA-EPD-86-112	April 1981	W	

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433	FHWA	Hydraulic Engineering Circular Number 18 (HEC-18), Evaluating Scour at Bridges FHWA-NHI-01-001	May 2001	W	
434	FHWA	Hydraulic Engineering Circular Number 2 (HEC-2), Highway Hydrology FHWA-NHI-02-001	October 2002	W	√
435	FHWA	Hydraulic Engineering Circular Number 21 (HEC-21), Design of Bridge Deck Drainage Systems FHWA-SA-92-010	May 1993	W	
436	FHWA	Hydraulic Engineering Circular Number 22 (HEC-22), Urban Drainage Design Manual FHWA-NHI-01-021	August 2001	W	√
437	FHWA	Hydraulic Engineering Circular Number 23 (HEC-23), Bridge Scour and Stream Instability Countermeasures-Experience, Selection and Design	July 1997	W	√
438	FHWA	Hydraulic Engineering Circular Number 24 (HEC-24), Highway Stormwater Pump Station Design FHWA-NHI-01-007	February 2001	W	
439	FHWA	Hydraulic Engineering Circular Number 4 (HEC-4), Introduction to Highway Hydraulics FHWA-NHI-01-019	August 2001	W	√
440	FHWA	Hydraulics of Iowa DOT Slope-Tapered Pipe Culverts FHWA-RD-01-077	June 2001	W	
441	FHWA	Lateral Support Systems and Underpinning, Volume 1 FHWA-RD-75-128	April 1976	W	
442	FHWA	Lateral Support Systems and Underpinning, Volume 2 FHWA-RD-75-129	April 1976	W	

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443	FHWA	Lateral Support Systems and Underpinning, Volume 3 FHWA-RD-75-130	April 1976	W	
444	FHWA	Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures FHWA-HI-98-032	1998	W	
445	FHWA	Load Transfer for Drilled Shafts in Intermediate Geomaterials FHWA_RD-95-038	November 1996	W	
446	FHWA	Manual for Design & Construction Monitoring of Soil Nail Walls - CADD Files FHWA-SA-96-069R	October 1998	W	√
447	FHWA	Manual for Design & Construction Monitoring of Soil Nail Walls Appendices FHWA-SA-96-069R	October 1998	W	√
448	FHWA	Manual for Design & Construction Monitoring of Soil Nail Walls FHWA-SA-96-069R	October 1998	W	√
449	FHWA	Manual on Design and Construction of Driven Pile Foundations FHWA/DP-66-1	April 1996	IS	√
450	FHWA	Manual on Design and Construction of Driven Pile Foundations FHWA-HI-97-013	November 1998	W	√
451	FHWA	Manual on Design and Construction of Driven Pile Foundations FHWA-HI-97-014	November 1998	W	√
452	FHWA	Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines FHWA-NHI-00-043	March 2001	W	√
453	FHWA	Pedestrian Facilities Users Guide	August 2000	W	√
454	FHWA	PEDSAFE Pedestrian Safety Guide FHWA-SA-04-003	September 2004	W	√

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455	FHWA	Permanent Ground Anchors, Volume 1, Final Report FHWA-DP-90-068	April 1990	W	
456	FHWA	Permanent Ground Anchors, Volume 2, Field Demonstration Project Summaries FHWA-DP-90-068	April 1990	W	
457	FHWA	Prefabricated Vertical Drains Volume I, Engineering Guidelines FHWA-RD-86-168	August 1986	W	
458	FHWA	Prefabricated Vertical Drains Volume II, Engineering Guidelines FHWA-RD-86-169	August 1986	IS	
459	FHWA	Prefabricated Vertical Drains Volume III, Engineering Guidelines FHWA-RD-86-170	August 1986	IS	
460	FHWA	Pressuremeter Test for Highway Applications FHWA-IP-89-008	July 1989	IS	√
461	FHWA	Reinforced Soil Structures, Volume I: Design and Construction Guidelines FHWA-RD-89-043	November 1990	IS	√
462	FHWA	Reinforced Soil Structures, Volume II-Summary of Research and Systems Information FHWA-RD-89-044	November 1989	IS	√
463	FHWA	RSS Reinforced Slope Stability A Microcomputer Program User's Manual FHWA-SA-96-039	January 1997	IS	√
464	FHWA	Soil Nailing Field Inspectors Manual FHWA-SA-93-068	April 1994	W	√
465	FHWA	Soils and Foundations Workshop Manual Volume I FHWA-NHI-06-088	3rd Edition December 2006	W	√
466	FHWA	Soils and Foundations Workshop Manual Volume II FHWA-NHI-06-089	3rd Edition December 2006	W	√

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467	FHWA	South Dakota Culvert Inlet Design Coefficients FHWA-RD-01-076	February 1996	W	
468	FHWA	Spread Footings for Highway Bridges FHWA-RD-86-185	October 1987	IS	
469	FHWA	Static Testing of Deep Foundations FHWA-SA-91-042	February 1992	W	
470	FHWA	Subsurface Investigations – Geotechnical Site Characterization; Reference Manual FHWA-NHI-01-031	May 2002	W	√
471	FHWA	Subsurface Investigations FHWA-HI-97-021	November 1997	W	√
472	FHWA	Subsurface Utility Engineering	May 24, 2007	W	√
473	FHWA	Summary Report of Research on Permanent Ground Anchor Walls; Volume I FHWA-RD-98-065	September 1998	W	
474	FHWA	Summary Report of Research on Permanent Ground Anchor Walls; Volume II FHWA-RD-98-066	September 1998	IS	
475	FHWA	Summary Report of Research on Permanent Ground Anchor Walls; Volume III FHWA-RD-98-067	September 1998	W	
476	FHWA	Summary Report of Research on Permanent Ground Anchor Walls; Volume IV FHWA-RD-98-068	September 1998	W	
477	FHWA	The Cone Penetration Test FHWA-SA-91-043	2007	W	√
478	FHWA	The Osterberg CELL for Load Testing Drilled Shafts and Driven Piles FHWA-SA-94-035	February 1995	IS	
479	FHWA	Tiebacks FHWA-RD-82-047	July 1982	W	√

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480	FHWA	Utility Relocation and Accommodation on Federal-Aid Highway FHWA-IF-03-014	6th Edition January 2003	W	√
481	Illuminating Engineering Society of North America	Roadway Lighting, ANSI Approved	July 1, 2000	IS	√
482	Institute of Transportation Engineering (ITE)	Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities	January 2005	IS	
483	Institute of Transportation Engineering (ITE)	Enhancing Intersection Safety Through Roundabouts	December 2008	IS	
484	Institute of Transportation Engineering (ITE)	Freeway and Interchange Geometric Design Handbook	January 2005	IS	√
485	Institute of Transportation Engineering (ITE)	Parking Generation	3rd Edition	IS	
486	Institute of Transportation Engineering (ITE)	Traffic Engineering Handbook	6th Edition 2009	IS	√
487	Institute of Transportation Engineering (ITE)	Traffic Engineering Handbook	5th Edition	IS	√
488	Institute of Transportation Engineering (ITE)	Transportation Impact Analyses for Site Development	January 2006	IS	√
489	Institute of Transportation Engineering (ITE)	Transportation Planning Handbook	3rd Edition	IS	√

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490	Institute of Transportation Engineering (ITE)	Trip Generation	8th Edition	IS	√
491	Institute of Transportation Engineering (ITE)	Trip Generation	7th Edition	IS	√
492	Institute of Transportation Engineering (ITE)	Trip Generation and Trip Generation Handbook	2nd Edition & 7th Edition	IS	√
493	Institute of Transportation Engineering (ITE)	Urban Street Geometric Design Handbook	December 2008	IS	
494	International Code Council (ICC)	International Building Code	2009	IS	√
495	International Municipal Signal Association	IMSA Catalog on Cables IMSA Specification No. 50-2 on Loop Detector Lead-In Cable	2007 February 1, 2001	W	√
496	International Society of Arboriculture (ISA)	Guide for Plant Appraisal	9th Edition 2000	IS	√
497	ISO	ISO 9000	October 16, 2005	IS	√
498	ISOA	Guide for Plant Appraisal Workbook	2000	IS	√
499	Military Specifications	MIL-A-8625FC	September 10, 1993	IS	√
500	National Fire Protection Agency (NFPA)	National Electric Code Standards	2008	IS	√

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501	National Spatial Data Infrastructure (NSDI)	Geospatial Positioning Accuracy Standards, Part 3: National Standards for Spatial Data Accuracy, FGDC-STD-007.3-1998	1998	W	√
502	NCHRP	Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features	1993	W	√
503	NCHRP	Synthesis 360, Rock-Socketed Shafts for Highway Structure Foundations	September 1, 2006	W	
504	NCHRP	Synthesis 368, Cone Penetration Testing		W	√
505	NCHRP	Web Document 16 - Improved Surface Drainage of Pavements – Final Report (Project I-29) Proposed Design Guidelines for Reducing Hydroplaning on New and Rehabilitated Pavements - TRB	June 1998	IS	√
506	NEMA	National Electrical Manufacturers Association (NEMA) Standards	Various	IS	√
507	NEMA Joint Publication / Insulated Cable Engineers Association (ICEA)	NEMA WC57-2004	December 20, 2004	IS	√
508	NEMA Joint Publication/ Insulated Cable Engineers Association (ICEA)	ANSI/NEMA WC70-2009 ANSI/NEMA WC 71-1999 NEMA WC 74-2006	June 8, 2009 January 1, 1999 January 1, 2006	IS	√

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509	Statue	California State Statutes XXXX		IS	√
510	The Society for Protective Coatings	QP2 Standard Procedure for Evaluating the Qualifications of Painting Contractors to Remove Hazardous Paint	Various	IS	√
511	TIA	455-59-FOTP-59	February 1, 2000	IS	√
512	TIA	492AAAA	November 1, 2009	IS	√
513	TIA	526-14-A-OFSTP-14	August 1, 1998	IS	√
514	TRB	Highway Capacity Manual	2000	IS	√
515	U.S. Geological Survey	Users Manual for Program PEAKFQ, Annual Flood Frequency Analysis Using Bulletin 17B Guidelines	January 30, 1998	W	√
516	US Army Corps of Engineers (COE)	Methods Used in Tieback Wall Design and Construction to Prevent Local Anchor Failure, Progressive Anchorage Failure, and Ground Mass Stability Failure	December 2002	W	
517	US Army Corps of Engineers (COE)	Wetlands Delineation Manual	January 1987	W	
518	US DOT	National ITS Architecture	Various	IS	√
519	US General Services Administration	Federal Color Standard, 595, Rev B	December 15, 1989	W	
520	USDA	RUS 7 CFR 1755.900 (Part A) RUS 7 CFR 1755.900 (Part B) RUS 7 CFR 1755.900 (Part C)	February 17, 2009	W	√
521	USDA	RUS Splicing Standard PC-2, Section 3.3	February 27, 1995	W	√

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522	USGS	Generalized Skew Coefficients for Flood-Frequency Analysis in California	June 8, 2007	IS	√
523	Caltrans	2010 Revised Standard Plans	April 20, 2012	W	√

2 MODIFICATIONS TO DEPARTMENT (CALTRANS) MANUALS

The following notes apply to the Caltrans Manuals used on this Project:

1. The Department (Caltrans) Manuals were created as an internal guidance document for use by various Department (Caltrans) personnel. As such, the Manuals are written as a guidance documents and not as mandatory requirements. For purposes of design-build projects, the Design-Builder shall assume that all provisions of the Manual, including the figures and tables, are mandatory and guidelines shall be assumed to be requirements. All words such as "should," "may," "must," "might," "could," and "can" shall mean "shall" unless the context requires otherwise, as determined in the sole discretion of Department. The Design-Builder shall disregard qualifying words such as "usually," "normally," and "generally." It shall be in Department's sole discretion to determine when the context does not require a provision to be mandatory.
2. Department (Caltrans) Manuals are standard documents for use by Department (Caltrans) personnel. For purposes of design-build projects, the Design-Builder shall assume that all of the provisions of the Standards are requirements.
3. Individual manuals are available in electronic format. All the Department (Caltrans) manuals can be accessed at the following Web Site: http://caltrans-opac.ca.gov/publicat.htm
4. If the department (Caltrans) Manual expires during the course of the Project the Design-Builder shall contact Department to determine if they should continue to use the manual or if it will be replaced.
5. Any references related to pay items or quantities, measurement for payment, method of measurement, basis of payment, extra work, adjustment of unit prices, or similar phrases shall be disregarded by the Design-Builder , since the Contract Price is full compensation for the Work.
6. No changes have been made to provisions in the Manual that do not apply to design-build contracts, but that provide general information (e.g., descriptions of Department (Caltrans) divisions and their duties, descriptions of legal authority, or descriptions of internal Department (Caltrans) procedures); however, in some cases it may not be clear whether rights or responsibilities are applicable to the Design-Builder. If it is unclear whether specific provisions in the Manual are applicable to the Design-Builder, the Design-Builder shall raise the issue with Department and Department shall make that determination in its sole discretion.
7. The Design-Builder shall disregard the paragraphs within the manuals relating to questions. All questions shall be taken to the Department's Contract Manager.
8. All references to the Engineer shall mean the Design-Builder unless otherwise directed by Department.
9. All references to the Agency shall mean Department (Caltrans), unless noted otherwise.
10. All references to Caltrans shall mean the Design-Builder, unless otherwise noted.
11. All references to Caltrans offices and personnel shall mean the Design-Builder's similar offices and personnel.

12. When the Manual refers to an action being necessary or needed, the Design-Builder shall construe the action as required unless the context requires otherwise, as determined in the sole discretion of Department.

13. In addition, phrases relating to items such as activity[ies] that "will be" conducted, that are "most easily accomplished by", that "are recommended", that "is usually necessary", that "should preferably be" done, that "might require", that "is necessary" or "as necessary", that "are" (or "is") "required" or "done" shall be construed to be mandatory requirements unless the context requires otherwise, as determined in the sole discretion of Department. Phrases relating to problems with activity[ies] that should not be conducted, such as "is not normally used," "is not good practice," "should never be done," "cannot be used," or "should be avoided" shall be construed as prohibited. It shall be in Department's sole discretion to determine when the context either requires or does not require a provision to be mandatory.

14. Where the notes refer to items that are indicated in the plans or special provisions or required in the plans or special provisions, the plans or special provisions shall mean the Design-Builder's plans or special provisions.

15. Where the notes refer to the Engineer, they shall mean the Design-Builder unless otherwise specified below.

16. When the Manual refers to other manuals, the version of these manuals applicable to this design-build project is the version current at the time of the date of this Invitation. For Bid (IFB) unless modified by Addendum or Change Order.

17. References to approved products or materials shall mean Approved by Caltrans.

18. References to payment, pay items and quantities are hereby deleted.

19. All references to the Inspector, the Field Inspector, the Project Engineer, the Engineer, the Materials Engineer, the District Materials Engineer, the Survey Crew, the Project Supervisor, the Agency Certified Technician, the Certified Plant Technician, and the Representative of the Office of Materials shall mean the Design-Builder, unless noted otherwise.

20. All references to the Department (Caltrans) facilities, including the Office of Materials Laboratory, Central Laboratory, Cement Laboratory, Concrete & Metals Laboratory, Aggregate Laboratory, Chemical Laboratory, Mix Design Laboratory, District Laboratory, and the Laboratory shall mean the Design-Builder's similar Laboratory facilities, unless noted otherwise.

21. The Design-Builder shall use forms as required to report the same information and in the same format as the Caltrans forms shown in the Manuals.

22. The Design-Builder shall complete all laboratory testing at a Department certified and approved facility with current AASHTO Materials Reference Laboratory (AMRL) certification.

3 MODIFICATIONS TO TECHNICAL MEMORANDA (NOT USED)

4 DESIGN-BUILD MODIFICATIONS TO THE CALTRANS STANDARD SPECIFICATIONS 2010 EDITION

General

These Contract Provisions are a revised version of the *Caltrans Standard Specifications 2010 Edition* and contain requirements generally applicable to the Work to be performed by Design-Builder. In certain cases provisions in the Standard Specifications have been superseded by other provisions of the Contract Documents. For ease of reference, this document uses the same section numbers as the Standard Specifications and identifies provisions of the Contract Documents that have replaced or modified the standard clauses. If there are conflicts between the "General" Modifications and the Specific Modifications below, the Specific Modifications have precedence over the General Modifications. If the Design-Builder believes that a modification is unclear, the Design-Builder shall have the obligation to raise the issue with Department. Regardless of whether the Design-Builder raises the issue, Department shall always have the right to notify the Design-Builder if the Design-Builder is interpreting the modification incorrectly. Any references to other standards, codes, or criteria, or to the latest version of other standards, codes, or criteria in the Project Requirements of the Contract Documents shall mean the latest version as of the Request for Proposals (RFP) issue date. Those standard specifications that are left blank are not modified in this Modification document, but they may be modified by Special Provisions or other Contract Documents. All Sections are incorporated herein, except as otherwise provided in the Contract Documents, and with the following general and specific exceptions:

General Exceptions:

1. When these Specifications refer to "Measurement for Payment," "Method of Measurement," or "Payment Quantities," such language shall be disregarded. It is not the intent of the Design-Build Contract that the various components of the Work will be measured for payment. Final payment will be at the Contract Price for the completed Project irrespective of the quantities of the various components incorporated in the Work.
2. When these Specifications refer to "basis of payment," "unit prices," or "adjustments of unit prices," such references and language shall be disregarded, except unit prices as identified in the Project Requirements, applicable to disincentives for Nonconforming Work or incentives for surface ride quality shall be either the specific dollar amount set forth in the standard specifications or a unit price proposed by the Design-Builder and Approved by Department.
3. When these Specifications refer to "extra work," "compensation for," "at the Department's expense," "quantity adjustments," "equivalent quantities," or similar phrases, such references shall be disregarded. It is intended that the payment of the Contract Price will be full compensation for all Work performed pursuant to the Design-Build Contract unless specific provisions for additional payments are contained in the Contract Documents. An exception to this general exclusion will be the provisions of Sections 10 thru 99, as modified by the Special Provisions, relating to incentives for surface ride quality and disincentives for Nonconforming Work.
4. When these specifications refer to the term "Special Provision," such term shall mean Contract Documents.
5. When these specifications refer to the term "incidental" such term shall mean that the costs shall be included in the Design-Builder's Price Proposal.

A. Section 1 through 9 - General Provisions – Specific Modifications

Section 1 General

1-1.01 GENERAL

This section is applicable to this project.

1-1.02 STYLE VARIATIONS

This section is applicable to this project.

1-1.03–1-1.04 RESERVED

1-1.05 REFERENCES

This section is deleted in its entirety. Provisions regarding "References" in this section are set forth in Book 1, Section 1 "Contract Components; Interpretation of Contract Documents" of the Contract Documents.

1-1.06 ABBREVIATIONS

This section is applicable to this project.

1-1.07 DEFINITIONS

1-1.07A General

Interpret terms as defined in the Contract documents. References to "Bid Item List" shall mean Price Proposal.

1-1.07B Glossary

This section is applicable to this project.

1-1.08 DISTRICTS

This section is applicable to this project.

1-1.09 FREEZE-THAW AREAS

This section is applicable to this project.

1-1.10 RESERVED

1-1.11 WEB SITES, ADDRESSES, AND TELEPHONE NUMBERS

This section is applicable to this project.

1-1.12 MISCELLANY

Make checks and bonds payable to the Department of Transportation.

1-1.13–1-1.15 RESERVED

Section 2 Bidding

This section is deleted in its entirety. Provisions regarding "Bidding" are set forth in the Instructions to Proposers (ITP) of the Contract Documents.

Section 3 Contract Award and Execution

This section is deleted in its entirety. Provisions regarding "Contract Award and Execution" are set forth in the Instruction to Proposers of the Contract Documents.

Section 4 Scope of Work

4-1.01 GENERAL

Section 4 includes specifications related to the scope of work.

4-1.02 INTENT

The Contract intent is to provide for work completion using the best general practices.

Nothing in the specifications voids the Contractor's public safety responsibilities.

4-1.03 WORK DESCRIPTION

This section is deleted in its entirety. Provisions regarding “Work Description” in this section are set forth in the Contract Documents.

4-1.04 USE OF MATERIALS FOUND ON THE JOB SITE

This section is deleted in its entirety. Any materials required to be removed from the Project shall become the property of the Design-Builder and shall be disposed of at an appropriate off-site disposal facility provided by the Design-Builder unless otherwise provided in the Contract Documents.

4-1.05 CHANGES AND EXTRA WORK

4-1.05A General

This section is deleted in its entirety. Provisions regarding “General” in this section are set forth in Book 1, Section 13 “Changes in the Work” of the Contract Documents.

4-1.05B Work-Character Changes

This section is deleted in its entirety. Provisions regarding “Work-Character Changes” in this section are set forth in Book 1, Section 13 “Changes in the Work” of the Contract Documents.

4-1.06 DIFFERING SITE CONDITIONS (23 CFR 635.109)

4-1.06A General

Reserved

4-1.06B Contractor's Notification

This section is deleted in its entirety. Provisions regarding “Contractor’s Notification” in this section are set forth in Book 1, Section 13 “Changes in the Work” of the Contract Documents.

4-1.06C Engineer's Investigation and Decision

This section is deleted in its entirety. Provisions regarding “Engineer’s Investigation and Decision” in this section are set forth in Book 1, Section 13 “Changes in the Work” of the Contract Documents.

4-1.07 VALUE ENGINEERING

4-1.07A General

Reserved

4-1.07B Value Engineering Change Proposal

This section is deleted in its entirety.

4-1.07C Value Analysis Workshop

This section is deleted in its entirety.

4-1.08–4-1.12 RESERVED

4-1.13 CLEANUP

This section is deleted in its entirety. Provisions regarding "Cleanup" in this section are set forth in Book 1, Section 20 "Acceptance of Project" of the Contract Documents.

Section 5 Control of Work

5-1.01 GENERAL

This section is applicable to this project.

5-1.02 CONTRACT COMPONENTS

This section is hereby deleted in its entirety. Provisions regarding "Contract Components" in this section are set forth in the Book 1, Section 1 Contract Components; Interpretation of Contract Documents.

5-1.03 ENGINEER'S AUTHORITY

This section is hereby deleted in its entirety. Provisions regarding "Engineer's Authority" in this section are set forth in Book 1, Section 5 "Control of Work" of the Contract Documents. Department has the authority by written order to suspend the Work wholly or in part for the reasons delineated in Book 1, Section 15 "Termination for Convenience" of the Contract Documents. Failure to enforce a contract provision does not waive enforcement of any contract provision.

5-1.04–5-1.05 RESERVED

5-1.06 PROTESTS

This section is hereby deleted in its entirety. Provisions regarding "Protests" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.07–5-1.08 RESERVED

5-1.09 PARTNERING

5-1.09A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.09B Partnering Facilitator, Workshops, and Monthly Evaluation Surveys

This section is hereby deleted in its entirety. Provisions regarding "Partnering Facilitator, Workshops, and Monthly Evaluation Surveys" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.09C Training in Partnering Skills Development

This section is hereby deleted in its entirety. Provisions regarding "Training in Partnering Skills Development" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.09D Payment

This section is hereby deleted in its entirety. Provisions regarding "Payment" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.10–5-1.11 RESERVED

5-1.12 ASSIGNMENT

This section is hereby deleted in its entirety. Provisions regarding "Assignment" in this section are set forth in Book 1, Section 23 "Miscellaneous Provisions" of the Contract Documents.

5-1.13 SUBCONTRACTING

5-1.13A General

This section is applicable to this project.

5-1.13B Disadvantaged Business Enterprises

5-1.13B(1) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 7 "Equal Employment opportunity; Subcontracts; Labor" of the Contract Documents.

5-1.13B(2) Underutilized Disadvantaged Business Enterprises

This section is hereby deleted in its entirety. Provisions regarding "Disadvantaged Business Enterprises" in this section are set forth in Book 1, Section 7 "Equal Employment opportunity; Subcontracts; Labor" of the Contract Documents.

5-1.13C Disabled Veteran Business Enterprises

This section is hereby deleted in its entirety.

5-1.13D Non–Small Businesses

This section is hereby deleted in its entirety.

5-1.13E–5-1.13I Reserved

5-1.14–5-1.15 RESERVED

5-1.16 REPRESENTATIVE

This section is hereby deleted in its entirety. Provisions regarding "Representative" in this section are set forth in Book 1, Section 23 "Miscellaneous Provisions" of the Contract Documents.

5-1.17 CHARACTER OF WORKERS

This section is hereby deleted in its entirety. Provisions regarding "Character of Workers" in this section are set forth in Book 1, Section 7 "Equal Employment opportunity; Subcontracts; Labor" of the Contract Documents.

5-1.18–5.19 RESERVED

5-1.20 COORDINATION WITH OTHER ENTITIES

5-1.20A General

This section is applicable to this project.

5-1.20B Permits, Licenses, Agreements, and Certifications

5-1.20B(1) General

This section is applicable to this project.

5-1.20B(2) Before Award

This section is applicable to this project.

5-1.20B(3) After Award

This section is applicable to this project.

5-1.20B(4) Contractor–Property Owner Agreement

This section is applicable to this project.

5-1.20C Railroad Relations

Reserved

5-1.20D–5-1.20F Reserved

5-1.21–5-1.22 RESERVED

5-1.23 SUBMITTALS

5-1.23A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 2, Section 2 "Project Management" of the Contract Documents.

5-1.23B Action Submittals

5-1.23B(1) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 2, Section 2 "Project Management" of the Contract Documents.

5-1.23B(2) Shop Drawings

This section is hereby deleted in its entirety. Provisions regarding "Shop Drawings" in this section are set forth in Book 2, Section 2 "Project Management" and Section 13 "Structures" of the Contract Documents.

5-1.23B(3) Product Data

Reserved

5-1.23B(4) Samples

Reserved

5-1.23B(5) Test Samples

This section is applicable to this project.

5-1.23B(6) Quality Control Plans

This section is hereby deleted in its entirety. Provisions regarding "Quality Control Plans" in this section are set forth in Book 2, Section 2 "Project Management" of the Contract Documents.

5-1.23B(7) Work Plans

Reserved

5-1.23C Informational Submittals

This section is applicable to this project.

5-1.24–5-1.25 RESERVED

5-1.26 CONSTRUCTION SURVEYS

This section is hereby deleted in its entirety. Provisions regarding "Construction Surveys" in this section are set forth in Book 2, Section 9 "Land Surveying" of the Contract Documents.

5-1.27 RECORDS

5-1.27A General

Reserved

5-1.27B Record Retention

This section is hereby deleted in its entirety. Provisions regarding "Record Retention" in this section are set forth in Book 1, Section 22 "Documents and Records" of the Contract Documents.

5-1.27C Record Inspection, Copying, and Auditing

This section is hereby deleted in its entirety. Provisions regarding "Record Inspection, Copying, and Auditing" in this section are set forth in Book 1, Section 22 "Documents and Records" of the Contract Documents.

5-1.27D Cost Accounting Records

This section is hereby deleted in its entirety. Provisions regarding "Cost Accounting Records" in this section are set forth in Book 1, Section 22 "Documents and Records" of the Contract Documents.

5-1.27E Change Order Bills

This section is hereby deleted in its entirety. Provisions regarding "Change Order Bills" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.28–5-1.29 RESERVED

5-1.30 NONCOMPLIANT AND UNAUTHORIZED WORK

This section is hereby deleted in its entirety. Provisions regarding "Noncompliant and Unauthorized Work" in this section are set forth in Book 1, Section 5 "Control of Work" of the Contract Documents.

5-1.31 JOB SITE APPEARANCE

This section is applicable to this project.

5-1.32 AREAS FOR USE

This section is applicable to this project. References to Section 7-1.05 shall mean Book 1, Section 18 "Indemnification" of the Contract Documents.

5-1.33 EQUIPMENT

This section is applicable to this project.

5-1.34–5-1.35 RESERVED

5-1.36 PROPERTY AND FACILITY PRESERVATION

5-1.36A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 10 "Risk of Loss" of the Contract Documents.

5-1.36B Landscape

This section is applicable to this project.

5-1.36C Railroad Property

This section is hereby deleted in its entirety. Provisions regarding "Railroad Property" in this section are set forth in Book 1, Section 2 "Obligations of Design-Builder" of the Contract Documents.

5-1.36D Nonhighway Facilities

This section is applicable to this project.

5-1.37 MAINTENANCE AND PROTECTION

5-1.37A General

This section is applicable to this project.

5-1.37B Load Limits

5-1.37B(1) General

This section is applicable to this project.5-1.37B(2) Increased Load Carrying Capacity

This section is applicable to this project.

5-1.37B(3) Material Hauling Equipment Lane on Bridges

This section is applicable to this project.

5-1.38 MAINTENANCE AND PROTECTION RELIEF

This section is hereby deleted in its entirety. Provisions regarding "Maintenance and Protection Relief" in this section are set forth in Book 1, Section 10 "Risk of Loss" of the Contract Documents.

5-1.39 DAMAGE REPAIR AND RESTORATION

5-1.39A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 10 "Risk of Loss" of the Contract Documents.

5-1.39B Damage Caused by an Act of God

This section is hereby deleted in its entirety. Provisions regarding "Damage Caused by an Act of God" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.39C Landscape Damage

5-1.39C(1) General

This section is applicable to this project.

5-1.39C(2) Plant Establishment Period of 3 Years or More

This section is applicable to this project.

5-1.40–5-1.41 RESERVED

5-1.42 REQUESTS FOR INFORMATION

This section is applicable to this project.

5-1.43 POTENTIAL CLAIMS AND DISPUTE RESOLUTION

5-1.43A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 13 "Changes in the Work" and Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43B Initial Potential Claim Record

This section is hereby deleted in its entirety. Provisions regarding "Initial Potential Claim Record" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.43C Supplemental Potential Claim Record

This section is hereby deleted in its entirety. Provisions regarding "Supplemental Potential Claim Record" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.43D Full and Final Potential Claim Record

This section is hereby deleted in its entirety. Provisions regarding "Full and Final Potential Claim Record" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

5-1.43E Alternative Dispute Resolution

5-1.43E(1) General

5-1.43E(1)(a) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(b) Establishment of Procedures

This section is hereby deleted in its entirety. Provisions regarding "Establishment of Procedures" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(c) Dispute Meetings

This section is hereby deleted in its entirety. Provisions regarding "Dispute Meetings" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(d) Informal Dispute Meetings

This section is hereby deleted in its entirety. Provisions regarding "Informational Dispute Meetings" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(e) Recommendations

This section is hereby deleted in its entirety. Provisions regarding "Recommendations" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(f) Completion of Alternative Dispute Resolution

This section is hereby deleted in its entirety. Provisions regarding "Completion of Alternative Dispute Resolution" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(1)(g) Payment

This section is hereby deleted in its entirety. Provisions regarding "Payment" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(2) Dispute Resolution Advisor

5-1.43E(2)(a) General

This section is not applicable and hereby deleted in its entirety.

5-1.43E(2)(b) DRA Selection

This section is not applicable and hereby deleted in its entirety.

5-1.43E(2)(c) DRA Replacement

This section is not applicable and hereby deleted in its entirety.

5-1.43E(2)(d) DRA Traditional Dispute Meeting

This section is not applicable and hereby deleted in its entirety.

5-1.43E(3) Dispute Resolution Board

5-1.43E(3)(a) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(3)(b) DRB Member Selection

This section is hereby deleted in its entirety. Provisions regarding "DRB Member Selection" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(3)(c) DRB Member Replacement

This section is hereby deleted in its entirety. Provisions regarding "DRB Member Replacement" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(3)(d) DRB Progress Meetings

This section is hereby deleted in its entirety. Provisions regarding "DRB Progress Meeting" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43E(3)(e) DRB Traditional Dispute Meeting

This section is hereby deleted in its entirety. Provisions regarding "DRB Traditional Dispute Meeting" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

5-1.43F Reserved

5-1.44–5-1.45 RESERVED

5-1.46 FINAL INSPECTION AND CONTRACT ACCEPTANCE

This section is hereby deleted in its entirety. Provisions regarding "Final Inspection and Contract Acceptance" in this section are set forth in Book 1, Section 20 "Acceptance of Project" of the Contract Documents.

5-1.47–5-1.50 RESERVED

Section 6 Control of Material

6-1 GENERAL

6-1.01 GENERAL

Section 6 includes specifications related to control of materials.

6-2 MATERIAL SOURCE

6-2.01 GENERAL

This section is applicable to this project.

6-2.02 MATERIAL SOURCE

This section is applicable to this project.

6-2.03 DEPARTMENT-FURNISHED MATERIALS

This section is applicable to this project.

6-2.04 LOCAL MATERIALS

This section is hereby deleted in its entirety. Provisions regarding "Local Materials" in this section are set forth in Book 1, Section 5 "Control of Work" of the Contract Documents.

6-2.05 BUY AMERICA

6-2.05A General

Reserved

6-2.05B Crumb Rubber (Pub Res Code § 42703(D))

This section is applicable to this project.

6-2.05C Steel and Iron Materials (23 CFR 635.410)

This section is applicable to this project.

6-3 QUALITY

6-3.01 GENERAL

This section is applicable to this project.

6-3.02 SPECIFIC BRAND OR TRADE NAME AND SUBSTITUTION

This section is hereby deleted in its entirety.

6-3.03 AUTHORIZED LABORATORY LISTS

This section is applicable to this project.

6-3.04 QUALITY CONTROL

This section is applicable to this project.

6-3.05 QUALITY ASSURANCE

6-3.05A General

This section is applicable to this project.

6-3.05B Source Inspection Expense Deductions

This section is applicable to this project.

6-3.05C Material Source Inspection and Testing

This section is applicable to this project.

6-3.05D Job Site Inspection and Testing

This section is applicable to this project.

6-3.05E Certificates of Compliance

This section is applicable to this project.

6-3.05F Test Data, Test Reports, and Evaluation Reports

Reserved

6-3.05G Test Samples

This section is applicable to this project.

6-3.05H Reserved

6-3.05I Authorized Facility Audit Lists

This section is applicable to this project.

6-3.05J Quality Control Plans

Reserved

6-3.05K Authorized Material Lists

This section is applicable to this project.

6-3.05L Authorized Material Source Lists

This section is applicable to this project.

6-3.06 GUARANTEE

This section is hereby deleted in its entirety. Provisions regarding “Guarantee” in this section are set forth in Book 1, Section 21 “Warranties” of the Contract Documents.

Section 7 Legal Relations and Responsibility to the Public

7-1.01 GENERAL

This Section is applicable to this project.

7-1.02 LAWS

7-1.02A General

This section is applicable to this project.

7-1.02B U.S. Fair Labor Standards Act

This section is applicable to this project.

7-1.02C Emissions Reduction

This section is applicable to this project.

7-1.02D–7-1.02H Reserved

7-1.02I Government Code

7-1.02I(1) General

Reserved

7-1.02I(2) Nondiscrimination

This section is applicable to this project.

7-1.02J Reserved

7-1.02K Labor Code

7-1.02K(1) General

This section is applicable to this project.

7-1.02K(2) Wages

This section is applicable to this project.

7-1.02K(3) Certified Payroll Records (Labor Code § 1776)

This section is applicable to this project.

7-1.02K(4) Apprentices

This section is applicable to this project.

7-1.02K(5) Working Hours

This section is applicable to this project.

7-1.02K(6) Occupational Safety and Health Standards

7-1.02K(6)(a) General

This section is applicable to this project.

7-1.02K(6)(b) Excavation Safety

This section is applicable to this project.

7-1.02K(6)(c) Tunnel Safety

This section is applicable to this project.

7-1.02K(6)(d) Confined Space Safety

This section is applicable to this project.

7-1.02K(6)(e)–7-1.02K(6)(i) Reserved

7-1.02K(6)(j) Lead Safety

7-1.02K(6)(j)(i) General

Reserved

7-1.02K(6)(j)(ii) Lead Compliance Plan

This section is applicable to this project.

7-1.02K(6)(j)(iii–viii) Reserved

7-1.02K(6)(k)–7-1.02K(6)(t) Reserved

7-1.02L Public Contract Code

7-1.02L(1) General

Reserved

7-1.02L(2) Antitrust Claims

This section is applicable to this project.

7-1.02M Public Resources Code

7-1.02M(1) General

Reserved

7-1.02M(2) Reserved

7-1.02M(3) Surface Mining and Reclamation Act

This section is applicable to this project.

7-1.02M(4)–7-1.02M(7) Reserved

7-1.02N Reserved

7-1.02O Vehicle Code

This section is applicable to this project.

7-1.02P–7-1.02Q Reserved

7-1.02R Environmental Stewardship

This section is applicable to this project.

7-1.02S–7-1.02Z Reserved

7-1.03 PUBLIC CONVENIENCE

Provisions regarding "Public Convenience" are applicable to this project except when these Specifications refer to "extra work," "compensation for," "at the Department's expense," "quantity adjustments," "equivalent quantities," or similar phrases, such references shall be disregarded. It is the intent that the payment of the Contract Price will be full compensation for all Work performed pursuant to the Design-Build Contract unless specific provisions for additional payments are contained in the Contract Documents.

7-1.04 PUBLIC SAFETY

Provisions regarding "Public Safety" are applicable to this project, with the modifications noted below. When these provisions refer to Section 5-1.02 "Contract Components," this means Book 1, Section 1 "Contract Components; Interpretation of Contract Documents."

Replace "20 days" in the 14th paragraph of this section with: 25 days.

Replace "90 days" in the 14th paragraph of this section with: 125 days.

Add between the 18th and 19th paragraph of this section:

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.

7-1.05 INDEMNIFICATION

7-1.05A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 18 "Indemnification" of the Contract Documents.

7-1.05B Responsibility to Other Entities

This section is hereby deleted in its entirety. Provisions regarding "Responsibility to Other Entities" in this section are set forth in Book 1, Section 18 "Indemnification" of the Contract Documents.

7-1.06 INSURANCE

7-1.06A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06B Casualty Insurance

This section is hereby deleted in its entirety. Provisions regarding "Casualty Insurance" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06C Workers' Compensation and Employer's Liability Insurance

This section is hereby deleted in its entirety. Provisions regarding "Worker's Compensation and Employer's Liability Insurance" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06D Liability Insurance

7-1.06D(1) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06D(2) Liability Limits/Additional Insureds

This section is hereby deleted in its entirety. Provisions regarding "Liability Limits/Additional Insureds" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06D(3) Contractor's Insurance Policy is Primary

This section is hereby deleted in its entirety. Provisions regarding "Contractor's Insurance Policy is Primary" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06E Automobile Liability Insurance

This section is hereby deleted in its entirety. Provisions regarding "Automobile Liability Insurance" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06F Policy Forms, Endorsements, and Certificates

This section is hereby deleted in its entirety. Provisions regarding "Policy Forms, Endorsements, and Certificates" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06G Deductibles

This section is hereby deleted in its entirety. Provisions regarding "Deductibles" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06H Enforcement

This section is hereby deleted in its entirety. Provisions regarding "Enforcement" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.06I Self-Insurance

This section is hereby deleted in its entirety. Provisions regarding "Self-Insurance" in this section are set forth in Book 1, Section 9 "Insurance" of the Contract Documents.

7-1.07 LEGAL ACTIONS AGAINST THE DEPARTMENT

7-1.07A General

This section is applicable to this project.

7-1.07B Seal Coat Claims

This section is hereby deleted in its entirety.

7-1.08 PERSONAL LIABILITY

This section is hereby deleted in its entirety. Provisions regarding "Personal Liability" in this section are set forth in Book 1, Section 23 "Miscellaneous Provisions" of the Contract Documents.

7-1.09–7-1.10 RESERVED

7-1.11 FEDERAL LAWS FOR FEDERAL-AID CONTRACTS

7-1.11A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, "Exhibit D – Federal Laws for Federal-Aid Contracts" of the Contract Documents.

7-1.11B FHWA-1273

This section is hereby deleted in its entirety. Provisions regarding "FHWA-1273" in this section are set forth in Book 1, "Exhibit D – Federal Laws for Federal-Aid Contracts" of the Contract Documents.

7-1.11C Female and Minority Goals

This section is applicable to this project.

7-1.11D Training

This section is hereby applicable to this project in its entirety. Number of trainees or apprentices is shown in Book 1, Exhibit F "Federal and State Prevailing Wage Requirements".

Section 8 Prosecution and Progress

8-1.01 GENERAL

Section 8 includes specifications related to prosecuting the Contract and work progress.

8-1.02 SCHEDULE

8-1.02A General

This section is hereby deleted in its entirety.

8-1.02B Level 1 Critical Path Method Schedule

8-1.02B(1) General

This section is hereby deleted in its entirety.

8-1.02B(2) Schedule Format

This section is hereby deleted in its entirety.

8-1.02B(3) Updated Schedule

This section is hereby deleted in its entirety.

8-1.02C Level 2 Critical Path Method Schedule

8-1.02C(1) General

This section is hereby deleted in its entirety.

8-1.02C(2) Schedule Format

This section is hereby deleted in its entirety.

8-1.02C(3) Computer Software

8-1.02C(3)(a) General

This section is hereby deleted in its entirety.

8-1.02C(3)(b) Computer Software Training

This section is hereby deleted in its entirety.

8-1.02C(4) Data and Network Diagrams

This section is hereby deleted in its entirety.

8-1.02C(5) Baseline Schedule

This section is hereby deleted in its entirety.

8-1.02C(6) Updated Schedule

This section is hereby deleted in its entirety.

8-1.02C(7) Final Updated Schedule

This section is hereby deleted in its entirety.

8-1.02D Level 3 Critical Path Method Schedule

8-1.02D(1) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(2) Schedule Format

This section is hereby deleted in its entirety. Provisions regarding "Schedule Format" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(3) Computer Software

This section is hereby deleted in its entirety. Provisions regarding "Computer Software" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(4) Data, Network Diagrams, and Reports

This section is hereby deleted in its entirety. Provisions regarding "Data, Network Diagrams, and Reports" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(5) Preconstruction Scheduling Conference

This section is hereby deleted in its entirety. Provisions regarding "Preconstruction Scheduling Conference" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(6) Baseline Schedule

This section is hereby deleted in its entirety. Provisions regarding "Baseline Schedule" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(7) Updated Schedule

This section is hereby deleted in its entirety. Provisions regarding "Updated Schedule" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(8) Time Impact Analysis

8-1.02D(8)(a) General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(8)(b) Department-Owned Float

This section is hereby deleted in its entirety. Provisions regarding "Department-Owned Float" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(8)(c) Ordered Changes

This section is hereby deleted in its entirety. Provisions regarding "Ordered Changes" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(9) Final Updated Schedule

This section is hereby deleted in its entirety. Provisions regarding "Final Updated Schedule" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.02D(10) Payment

This section is hereby deleted in its entirety. Provisions regarding "Payment" are set forth in Book 1, Section 11 "Payment" of the Contract Documents.

8-1.02E–8-1.02F Reserved

8-1.03 PRECONSTRUCTION CONFERENCE

This section is deleted in its entirety. Provisions regarding "Preconstruction Conference" in this section are set forth in Book 2, Section 2 "Project Management" of Contract Documents.

8-1.04 START OF JOB SITE ACTIVITIES

This section is hereby deleted in its entirety. Provisions regarding "Start of Job Site Activities" in this section are set forth in Book 1, Section 4 "Time within which Project shall be Completed; Scheduling" of the Contract Documents.

8-1.04A General

Reserved

8-1.04B Standard Start

This section is hereby deleted in its entirety.

8-1.04C Delayed Start

Reserved

8-1.04D Early Return-Early Start

Reserved

8-1.04E Next-Day Start

Reserved

8-1.04F–8-1.04J Reserved

8-1.05 TIME

This section is hereby deleted in its entirety. Provisions regarding "Time" in this section are set forth in Book 1, Section 4 "Time within which Project shall be Completed; Scheduling" of the Contract Documents.

8-1.06 SUSPENSIONS

This section is hereby deleted in its entirety. Provisions regarding "Suspensions" in this section are set forth in Book 1, Section 14 "Suspension of Work" of the Contract Documents.

8-1.07 DELAYS

8-1.07A General

This section is hereby deleted in its entirety. Provisions regarding "General" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

8-1.07B Time Adjustments

This section is hereby deleted in its entirety. Provisions regarding "Time Adjustments" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

8-1.07C Payment Adjustments

This section is hereby deleted in its entirety. Provisions regarding "Payment Adjustments" in this section are set forth in Book 1, Section 11 "Payment" of the Contract Documents.

8-1.08–8-1.09 RESERVED

8-1.10 LIQUIDATED DAMAGES

This section is hereby deleted in its entirety. Provisions regarding "Liquidated Damages" in this section are set forth in Book 1, Section 17 "Damages" of the Contract Documents.

8-1.11–8-1.12 RESERVED

8-1.13 CONTRACTOR'S CONTROL TERMINATION

This section is hereby deleted in its entirety. Provisions regarding "Contractor's Control Termination" in this section are set forth in Book 1, Section 15 "Termination for Convenience" of the Contract Documents.

8-1.14 CONTRACT TERMINATION

This section is hereby deleted in its entirety. Provisions regarding "Contract Termination" in this section are set forth in Book 1, Section 15 "Termination for Convenience" and Section 16 "Default" of the Contract Documents.

8-1.15–8-1.16 RESERVED

Section 9 Payment

9-1.01 GENERAL

This section is applicable to this project.

9-1.02 MEASUREMENT

9-1.02A General

This section is hereby deleted in its entirety. Provisions regarding ”General” in this section are hereby replaced with the following: The purpose of measurement of quantities is to identify Quality Control and Verification testing frequency requirements as contained in the Materials Control Schedule and in tracking production rates for monthly payments to the Design-Builder based on percentage complete. All specifications within the *Caltrans Standard Specifications* containing sections describing Method of Measurement and Basis of Payment shall have the sections describing Method of Measurement and Basis of Payment deleted. The Design-Builder hereby acknowledges and agrees that the single lump sum Contract Price constitutes full compensation for performance of all of the Work, subject only to those exceptions specified in the Contract Documents.

9-1.02B Weighing Equipment and Procedures

9-1.02B(1) General

This section is applicable to this project.

9-1.02B(2) Equipment

This section is applicable to this project.

9-1.02B(3) Procedures

This section is applicable to this project.

9-1.02C Final Pay Item Quantities

This section is hereby deleted in its entirety.

9-1.02D Quantities of Aggregate and Other Roadway Materials

This section is applicable to this project.

9-1.03 PAYMENT SCOPE

This section is hereby deleted in its entirety. Provisions regarding “Payment Scope” in this section are set forth in Book 1, Section 11 “Payment” of the Contract Documents.

9-1.04 FORCE ACCOUNT

This section is applicable to this project.

9-1.04A General

This section is applicable to this project.

9-1.04B Labor

This section is applicable to this project.

9-1.04C Materials

This section is applicable to this project.

9-1.04D Equipment Rental

9-1.04D(1) General

This section is applicable to this project.

9-1.04D(2) Equipment On the Job Site

This section is applicable to this project.

9-1.04D(3) Equipment Not On the Job Site Required for Original-Contract Work

This section is applicable to this project.

9-1.04D(4) Equipment Not On the Job Site Not Required for Original-Contract Work

This section is applicable to this project.

9-1.04D(5) Non-Owner-Operated Dump Truck Rental

This section is applicable to this project.

9-1.05 EXTRA WORK PERFORMED BY SPECIALISTS

This section is hereby deleted in its entirety. Provisions regarding "Extra Work Performed by Specialists" are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

9-1.06 CHANGED QUANTITY PAYMENT ADJUSTMENTS

This section is hereby deleted in its entirety. Provisions regarding "Changed Quantity Payment Adjustments" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

9-1.07 PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

9-1.07A General

This section is hereby deleted in its entirety.

9-1.07B Asphalt Quantities

9-1.07B(1) General

Reserved

9-1.07B(2) Hot Mix Asphalt

This section is hereby deleted in its entirety.

9-1.07B(3) Rubberized Hot Mix Asphalt

This section is hereby deleted in its entirety.

9-1.07B(4) Modified Asphalt Binder in Hot Mix Asphalt

This section is hereby deleted in its entirety.

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

This section is hereby deleted in its entirety.

9-1.07B(6) Tack Coat

This section is hereby deleted in its entirety.

9-1.07B(7) Asphaltic Emulsion

This section is hereby deleted in its entirety.

9-1.07B(8) Slurry Seal

This section is hereby deleted in its entirety.

9-1.07B(9) Modified Asphalt Binder

This section is hereby deleted in its entirety.

9-1.07B(10) Other Materials

This section is hereby deleted in its entirety.

9-1.07C Payment Adjustments

This section is hereby deleted in its entirety. Provisions regarding "Payment Adjustments" in this section are set forth in Book 1, Section 11 "Payment" of the Contract Documents.

9-1.08–9-1.10 RESERVED

9-1.11 TIME-RELATED OVERHEAD

9-1.11A General

This section is applicable to this project.

9-1.11B Audit Examinations and Reports

This section is applicable to this project.

9-1.11C Payment

This section is applicable to this project.

9-1.12–9-1.14 RESERVED

9-1.15 WORK-CHARACTER CHANGES

This section is hereby deleted in its entirety. Provisions regarding "Work-Character Changes" in this section are set forth in Book 1, Section 13 "Changes in the Work" of the Contract Documents.

9-1.16 PROGRESS PAYMENTS

This section is hereby deleted in its entirety. Provisions regarding "Progress Payments" in this section are set forth in Book 1, Section 11 "Payment" and Book 2, Section "Project Management" of the Contract Documents.

9-1.16G–9-1.16M Reserved

9-1.17 PAYMENT AFTER CONTRACT ACCEPTANCE

This section is hereby deleted in its entirety. Provisions regarding "Payments after Contract Acceptance" in this section are set forth in Book 1, Section 11 "Payment" of the Contract Documents.

9-1.18–9-1.20 RESERVED

9-1.21 CLERICAL ERRORS

This section is hereby deleted in its entirety. Provisions regarding "Clerical Errors" in this section are set forth in Book 1, Section 11 "Payment" of the Contract Documents.

9-1.22 ARBITRATION

This section is hereby deleted in its entirety. Provisions regarding "Arbitration" in this section are set forth in Book 1, Section 19 "Partnering, Dispute Resolution" of the Contract Documents.

B. Sections 10 through 99

General Modifications

1. On technical issues "The Engineer" shall mean the Design-Builder.

2. On Administrative issues "The Engineer" shall mean Department.

If the Design-Builder believes that a definition of "The Engineer" is unclear, the Design-Builder shall have the obligation to raise the issue with Department. Regardless of whether the Design-Builder raises the issue, Department shall always have the right to notify the Design-Builder if the Design-Builder is interpreting the definition of "The Engineer" incorrectly.

Specific Modifications

For any specific modifications on Section 10 through 99, please refer to the Exhibit 4-A, "Revised Standard Specifications – Section 10 to Section 99".

EXHIBIT 4-A

Revised Standard Specifications - Section 10 to Section 99

^^^

DIVISION II GENERAL CONSTRUCTION

10 GENERAL

01-20-12

Replace "Reserved" in section 10-1 with:

01-20-12

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 areheld 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

Reserved10-2.01B–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

^^

12 TEMPORARY TRAFFIC CONTROL

04-19-13

Replace the 1st paragraph of section 12-3.01A(4) with:

10-19-12

Category 2 temporary traffic control devices must be on FHWA's list of acceptable, crashworthy Category 2 hardware for work zones. This list is available on FHWA's Safety Program Web site.

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

Replace the 3rd through 5th paragraphs of section 12-4.03 with:

04-19-13

Submit closure schedules using the Department's Internet-based LCS program to show the locations and times of the proposed closures.

The Department provides LCS training. Request 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 representatives.

Each representative must maintain a unique password and current user information in the LCS.

You will be notified through LCS of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

Submit closure schedule amendments using LCS, including adding additional closures, by noon at least 3 business days before a planned closure. Authorization of amendments will be at the discretion of the Engineer.

Cancel closure requests using LCS at least 48 hours before the time of the closure.

Add between the 7th and 8th paragraphs of section 12-4.03:

10-19-12

The contingency plan must identify the operations, equipment, processes, and materials that may fail and delay a reopening of a closure to traffic. List the additional or alternate equipment, materials, or workers necessary to ensure continuing operations and on-time opening of closures whenever 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.

Based on the Engineer's review, additional materials, equipment, workers, or time to complete operations from that specified in the contingency plan may be required.

Provide a general time-scaled logic diagram displaying the major activities and sequence of planned operations that comply with the requirements of section 12-4.03. For each operation, identify the critical event when the contingency plan will be activated.

Submit any revisions to the contingency plan for an operation at least 3 business days before starting that operation. Do not close any lanes until the contingency plan has been authorized.

The 5th paragraph of section 5-1.23B(1) does not apply to reviewing contingency plans.

09-16-11

Replace section 12-7 with:

09-16-11

12-7 RESERVED

^^

13 WATER POLLUTION CONTROL

04-19-13

04-19-13

Delete item 3 in the list in the 4th paragraph of section 13-1.01A.

01-20-12

Add to section 13-1.01A:

01-20-12

Comply with the Department's general permit issued by the State Water Resources Control Board for *Order No. 99-06-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

<u>13-3.01B(6)(c) Receiving Water Monitoring Trigger Report</u>

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

04-19-13

Delete the 1st sentence in the 2nd paragraph of section 13-4.03C(3).

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

10-19-12

Delete "or stockpile" in the 3rd paragraph of section 13-5.02F.

Replace section 13-5.03F with:

04-20-12

13-5.03F Reserved

10-19-12

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.

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.

10-19-12

Delete the 4th paragraph of section 13-9.01B.

10-19-12

Delete "if authorized" in the 1st sentence in the 1st paragraph of section 13-9.02A.

Replace "at least 3-inch" in the 3rd sentence in the 1st paragraph of section 13-9.02A with:

10-19-12

6-inch

^^

15 EXISTING FACILITIES

04-19-13

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

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.

04-19-13

Delete "and concrete expansion dams" in the 3rd paragraph of section 15-5.01C(4).

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.

10-19-12

Delete the 4th paragraph of section 15-5.05C.

Replace "51-1.03F(5)" in the 3rd paragraph of section 15-5.06C(1) with:

10-19-12

51-1.01D(4)

Replace "51-1.03E(5)" in the 5th paragraph of section 15-5.06C(1) with:

10-19-12

51-1.03F(5)

10-19-12

Delete the 9th paragraph of section 15-5.06C(1).

04-19-13

Delete the 15th paragraph of section 15-5.06C(1).

Add to section 15-5.06C(1):

10-19-12

Texture the polyester concrete surface before gelling occurs by longitudinal tining under 51-1.03F(5)(b)(iii), except do not perform initial texturing.

Replace section 15-5.06C(2) with:

04-19-13

15-5.06C(2) Reserved

04-19-13

Delete the 3rd paragraph of section 15-5.06D.

Replace the 1st paragraph in section 15-5.07B(4) with:

10-19-12

Payment for furnishing dowels is not included in the payment for core and pressure grout dowel.

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

Replace the heading of section 15-6.04 with:

01-18-13

INVERT PAVING

01-20-12

Replace the 5th paragraph of section 15-5.06C(1) with:

01-20-12

New deck concrete surfaces must comply with section 51-1.03F(5) before starting overlay work.

^^

DIVISION III GRADING

19 EARTHWORK

01-20-12

Replace the 2nd paragraph of section 19-3.01A(2)(b) with:

07-01-11

For cofferdams on or affecting railroad property, allow 85 days for review.

Add to the list in the 1st paragraph of section 19-3.01A(2)(d):

01-20-12

9. Provisions for discontinuous rows of soil nails

Replace "sets" in the 3rd and 4th paragraphs of section 19-3.01A(2)(d) with:

04-19-13

copies

Add to section 19-3.01A(3)(b):

01-20-12

For soil nail walls, wall zones are specified in the special provisions.

For ground anchor walls, a wall zone is the entire wall unless otherwise specified in the special provisions.

01-20-12

Delete the 2nd sentence in the 4th paragraph of section 19-3.01A(3)(b).

Replace "90" in the paragraph of section 19-3.02G with:

01-18-13

90-1

Replace the heading of section 19-3.03C with:

04-19-13

19-3.03B(4) Cofferdams

Replace the heading of section 19-3.03D with:

04-19-13

19-3.03B(5) Water Control and Foundation Treatment

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

01-20-12

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

Replace the 2nd paragraph of section 19-3.03F with:

01-20-12

Do not backfill over or place material over slurry cement backfill until 4 hours after placement. When concrete sand is used as aggregate and the in-place material is free draining, you may start backfilling as soon as the surface water is gone.

Add between the 2nd and 3rd paragraphs of section 19-3.03K:

01-20-12

Before you excavate for the installation of ground anchors in a wall zone:

1. Complete stability testing
2. Obtain authorization of test data

Replace the 2nd sentence of the 7th paragraph of section 19-3.03K:

01-20-12

Stop construction in unstable areas until remedial measures have been taken. Remedial measures must be submitted and authorized.

Add between the 8th and 9th paragraphs of section 19-3.03K:

01-20-12

When your excavation and installation methods result in a discontinuous wall along any soil nail row, the ends of the structurally completed wall section must extend beyond the ends of the next lower excavation lift by a distance equal to twice the lift height. Maintain temporary slopes at the ends of each wall section to ensure slope stability.

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 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.

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

^^

20 LANDSCAPE

10-19-12

10-19-12

Add "preparing holes," before "and" in the 1st paragraph of section 20-7.01A.

Replace "and handling" in the 1st paragraph of section 20-7.03A with:

10-19-12

handling, and preparing holes

Replace the 1st paragraph of section 20-7.03D with:

10-19-12

The location of all plants is as shown unless the Engineer designates otherwise. If the Engineer designates the location of plants, the location will be marked by stakes, flags, or other markers.

Replace item 1 in the list in the 1st paragraph of section 20-7.03I with:

10-19-12

1. Preparing holes and planting plants

10-19-12

Delete "Prepare Hole," in the last paragraph of section 20-7.04.

^^

21 EROSION CONTROL

04-19-13

Replace ", bonded fiber matrix, and polymer-stabilized fiber matrix" in the 1st paragraph of section 21-1.01B with:

04-20-12

and bonded fiber matrix

04-20-12

Delete the last paragraph of section 21-1.02E.

Replace section 21-1.02F(2) with:

04-20-12

21-1.02F(2) Reserved

Replace section 21-1.02J with:

04-20-12

21-1.02J Reserved

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

Replace the paragraph in section 21-1.02P with:

10-19-12

Fiber roll must be a premanufactured roll filled with rice or wheat straw, wood excelsior, or coconut fiber. Fiber roll must be covered with biodegradable jute, sisal, or coir fiber netting secured tightly at each end and must be one of the following:

1. 8 to 10 inches in diameter and at least 1.1 lb/ft
2. 10 to 12 inches in diameter and at least 3 lb/ft

Fiber roll must have a minimum functional longevity of 1 year.

Add between the 1st and 2nd paragraphs of section 21-1.03A:

01-18-13

Remove and dispose of trash, debris, and weeds in areas to receive erosion control materials.

Remove and dispose of loose rocks larger than 2-1/2 inches in maximum dimension unless otherwise authorized.

Protect the traveled way, sidewalks, lined drainage channels, and existing vegetation from overspray of hydraulically-applied material.

Replace section 21-1.03B with:

01-18-13

21-1.03B Reserved

Replace "3 passes" in item 2 in the list in the 2nd paragraph of section 21-1.03G with:

04-19-13

2 passes

Replace section 21-1.03I with:

04-20-12

21-1.03I Reserved

Add between the 4th and 5th paragraphs of section 21-1.03P:

10-19-12

If soil conditions do not permit driving the stakes into the soil, drill pilot holes to facilitate driving of the stakes.

01-18-13

Delete the 1st and 2nd sentences of the 3rd paragraph in section 21-1.04.

^^

DIVISION IV SUBBASES AND BASES

29 TREATED PERMEABLE BASES

04-20-12

Replace "section 68-4.02C" in the 6th paragraph of section 29-1.03A with:

04-20-12

section 64-4.03

^^

Replace section 30 with:

04-20-12

30 RECLAIMED PAVEMENTS

04-20-12

30-1 GENERAL

30-1.01 GENERAL

Section 30 includes specifications for reclaiming the pavement section and constructing a base.

30-2 FULL DEPTH RECLAIMED—FOAMED ASPHALT

Reserved

30-3–30-6 RESERVED

^^^

DIVISION V SURFACINGS AND PAVEMENTS

37 BITUMINOUS SEALS

01-18-13

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 "Reserved" in section 37-2.01D(1) with:

01-18-13

Aggregate suppliers, chip spreader operators, emulsion distributor, and for coated chips, the coated chips producer must attend the prepaving conference.

Add to section 37-2.03A:

04-20-12

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.

Add to section 37-3.01D(1):

01-18-13

Micro-surfacing spreader operators must attend the prepaving conference.

^^

DIVISION V SURFACINGS AND PAVEMENTS

39 HOT MIX ASPHALT

02-22-13

Add to section 39-1.01B:

02-22-13

processed RAP: RAP that has been fractionated.

substitution rate: Amount of RAP aggregate substituted for virgin aggregate in percent.

binder replacement: Amount of RAP binder in OBC in percent.

surface course: Upper 0.2 feet of HMA exclusive of OGFC.

Add to the end of the paragraph in section 39-1.02A:

10-19-12

as shown

01-20-12

Replace "less than 10 percent" in note "b" in the table titled "Aggregate Quality" of section 39-1.02E with:

01-20-12

10 percent or less

Replace the paragraphs in section 39-1.02F with:

02-22-13

39-1.02F(1) General

You may produce HMA Type A or B using RAP. HMA produced using RAP must comply with the specifications for HMA, except aggregate quality specifications do not apply to RAP. You may substitute 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:

1. Target air voids must equal 7 ± 1 percent
2. Number of test specimens must be 4
3. Test specimen must be a 6-inch gyratory compacted specimen
4. Test temperature must be set at 140 ± 2 degrees F
5. Measurements for impression must be taken at every 100 passes
6. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
7. Testing shut off must be set at 25,000 passes

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

For a RAP substitution rate greater than 15 percent, fractionate RAP into 2 sizes, a coarse fraction RAP retained on 1/4-inch screen and a fine fraction RAP passing 1/4-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. The asphalt binder content and specific gravity must meet the processed RAP quality characteristics. 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.

The processed RAP asphalt binder content must be within ± 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 ± 2.0 percent of the average binder content of the original processed RAP stockpile.

The maximum specific gravity for processed RAP must be within ± 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 ±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

Add to the 1st paragraph of section 39-1.03A:

09-16-11

If RAP is used, use Laboratory Procedure LP-9.

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.)	California Test 367			
No. 4 grading		17.0	17.0	--
3/8" grading		15.0	15.0	--
1/2" grading		14.0	14.0	18.0–23.0
3/4" grading		13.0	13.0	18.0–23.0
Voids filled with asphalt (%)	California Test 367			Note a
No. 4 grading		65.0–75.0	65.0–75.0	
3/8" grading		65.0–75.0	65.0–75.0	
1/2" grading		65.0–75.0	65.0–75.0	
3/4" grading		65.0–75.0	65.0–75.0	
Dust proportion	California Test 367			Note a
No. 4 and 3/8" gradings		0.6–1.2	0.6–1.2	
1/2" and 3/4" gradings		0.6–1.2	0.6–1.2	
Stabilometer value (min.)	California Test 366			
No. 4 and 3/8" gradings		30	30	--
1/2" and 3/4" gradings		37	35	23

[a] 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)[a]			
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)[a]			
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[a]	120	120	--
Moisture susceptibility (tensile strength ration, %)	California Test 371[a]	70	70	--

[a]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.

09-16-11

Replace item 4 in the list in the 1st paragraph of section 39-1.03C with:

01-20-12

4. JMF renewal on a *Caltrans Job Mix Formula Renewal* form, if applicable

Add after the last paragraph of section 39-1.03C:

02-22-13

For RAP substitution rate greater than 15 percent, submit with the JMF submittal:

1. California Test 371 tensile strength ratio and minimum dry strength test results
2. 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 item 4 in the list in the 1st paragraph of section 39-1.03C with:

01-20-12

4. JMF renewal on a *Caltrans Job Mix Formula Renewal* form, if applicable

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:

$$\text{Asphalt Binder Set Point} = \frac{\dfrac{BC_{OBC}}{\left(1 - \dfrac{BC_{OBC}}{100}\right)} - R_{RAP}\left[\dfrac{BC_{RAP}}{\left(1 - \dfrac{BC_{RAP}}{100}\right)}\right]}{100 + \dfrac{BC_{OBC}}{\left(1 - \dfrac{BC_{OBC}}{100}\right)}}$$

Where:
BC_{OBC} = optimum asphalt binder content, percent based on total weight of mix
R_{RAP} = RAP ratio by weight of aggregate
BC_{RAP} = asphalt binder content of RAP, percent based on total weight of RAP mix

Replace item 4 in the list in the 8th paragraph of section 39-1.03E with:

04-20-12

4. HMA quality specified in the table titled "HMA Mix Design Requirements" except:
   - 4.1. Air void content, design value ±2.0 percent
   - 4.2. Voids filled with asphalt, report only
   - 4.3. Dust proportion, report only

Replace the 12th paragraph of section 39-1.03E with:

04-20-12

If tests on plant-produced samples do not verify the JMF, the Engineer notifies you and you must submit a new JMF or submit an adjusted JMF based on your testing. JMF adjustments may include a change in aggregate gradation TV within the TV limits specified in the aggregate gradation tables.

Replace the 14th paragraph of section 39-1.03E with:

01-20-12

A verified JMF is valid for 12 months.

Replace the last sentence in the 15th paragraph of section 39-1.03E with:

01-20-12

This deduction does not apply to verifications initiated by the Engineer or JMF renewal.

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.

01-20-12

Delete the 4th paragraph of section 39-1.03F.

Replace items 3 and 5 in the 6th paragraph of section 39-1.03F with:

01-20-12

3. Engineer verifies each proposed JMF renewal within 20 days of receiving verification samples.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at the Department's expense 1 proposed JMF renewal within a 12-month period.

Add between the 6th and 7th paragraphs of section 39-1.03F:

01-20-12

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or the Engineer may perform aggregate quality tests for verification of JMF renewal.

Replace section 39-1.03G with:

04-20-12

39-1.03G Job Mix Formula Modification

For an accepted JMF, you may change asphalt binder source one time during production.

Submit your modified JMF request a minimum of 3 business days before production. Each modified JMF submittal must consist of:

1. Proposed modified JMF on *Contractor Job Mix Formula Proposal* form
2. Mix design records on *Contractor Hot Mix Asphalt Design Data* form for the accepted JMF to be modified
3. JMF verification on *Hot Mix Asphalt Verification* form for the accepted JMF to be modified

4. Quality characteristics test results for the modified JMF as specified in section 39-1.03B. Perform tests at the mix design OBC as shown on the *Contractor Asphalt Mix Design Data* form
5. If required, California Test 371 test results for the modified JMF.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 5 business days of receiving all verification samples. If California Test 371 is required, the Engineer tests for California Test 371 within 10 days of receiving verification samples.

The Engineer verifies the modified JMF after the modified JMF HMA is placed on the project and verification samples are taken within the first 750 tons following sampling requirements in section 39-1.03E, "Job Mix Formula Verification." The Engineer tests verification samples for compliance with:

1. Stability as shown in the table titled "HMA Mix Design Requirements"
2. Air void content at design value ±2.0 percent
3. Voids in mineral aggregate as shown in the table titled "HMA Mix Design Requirements"
4. Voids filled with asphalt, report only
5. Dust proportion, report only

If the modified JMF is verified, the Engineer revises your *Hot Mix Asphalt Verification* form to include the new asphalt binder source. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected.

The Engineer deducts $2,000 from payments for each modified JMF verification. The Engineer deducts an additional $2,000 for each modified JMF verification that requires California Test 371.

Replace section 39-1.03G with:

01-20-12

39-1.03G Job Mix Formula Modification

For an accepted JMF, you may change 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 "Hot Mix Asphalt Mix Design Requirements"
2. Air void content at design value ±2.0 percent
3. Voids in mineral aggregate as shown in the table titled "Hot Mix Asphalt Mix Design Requirements"
4. Voids filled with asphalt if an adjustment for asphalt binder content TV is more than ±0.3 percent from the original OBC shown on the *Contractor Asphalt Mix Design Data* form.
5. Dust proportion if an adjustment for asphalt binder content TV is more than ±0.3 percent from OBC shown on the *Contractor Asphalt Mix Design Data* form.

If the modified JMF is verified, the Engineer revises your *Hot Mix Asphalt Verification* form to include the new 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 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 the 2nd paragraph of section 39-1.04E with:

09-16-11

Sample RAP once daily and determine the RAP aggregate gradation under Laboratory Procedure LP-9 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.

02-22-13

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.

Replace the 15th paragraph of section 39-1.11 with:

01-20-12

For Standard and QC/QA construction processes, if 3/4-inch aggregate grading is specified, you may use a 1/2-inch aggregate grading if the specified total paved thickness is at least 0.15 foot and less than 0.20 foot thick.

Replace the 17th paragraph of section 39-1.11 with:

01-20-12

Do not open new HMA pavement to public traffic until its mid-depth temperature is below 160 degrees F.

- **Replace 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 "3 inches per 0.1-mile section" in the 5th paragraph of section 39-1.12C with:

01-20-12

2.5 inches per 0.1-mile section

Replace "6 inches per 0.1-mile section" in the 6th paragraph of section 39-1.12C with:

01-20-12

5 inches per 0.1-mile section

- **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[a]	California Test 202	1 per 750 tons and any remaining part at the end of the project	JMF ± Tolerance[b]	JMF ± Tolerance[b]	JMF ± Tolerance[b]	JMF ± Tolerance[b]
Sand equivalent (min)[c]	California Test 217		47	42	47	--
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (%, max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density)[d,e]	QC plan	2 per business day (min.)	91–97	91–97	91–97	--
Stabilometer value (min)[c]	California Test 366	1 per 4,000 tons or 2 per 5 business days, whichever is greater				
No. 4 and 3/8" gradings			30	30	--	--
1/2" and 3/4" gradings			37	35	23	--
Air void content (%)[c, f]	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[g]	California Test 226 or 370	2 per day during production	--	--	--	--
Percent of crushed particles coarse aggregate (%, min)	California Test 205	As designated in the QC plan. At least once per project				
One fractured face			90	25	--	90
Two fractured faces			75	--	90	75
Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured			70	20	70	90

face						
Los Angeles Rattler (%, max) Loss at 100 rev. Loss at 500 rev.	California Test 211		12 45	-- 50	12 40	12 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)[h]	California Test 234		45	45	45	--
Voids filled with asphalt (%)[i] 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)[i] 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[i] 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)[j] 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)[j] PG-58	AASHTO T 324 (Modified)	1 per 10,000 tons or 1 per project whichever	10,000	10,000	--	--

PG-64 PG-70 PG-76 or higher		is more	10,000 12,500 15000	10,000 12,500 15000		
Moisture susceptibility (minimum dry strength, psi)[j]	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--
Moisture susceptibility (tensile strength ration, %)[j]	California Test 371	For RAP ≥15% 1 per 10,000 tons or 1 per project whichever is greater	70	70	--	--
Smoothness	Section 39-1.12	--	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	Section 39-1.04C	--	--	1,500–4,000	1,500–4,000
Asphalt modifier	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D

[a] Determine combined aggregate gradation containing RAP under California Test 367.
[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[c] Report the average of 3 tests from a single split sample.
[d] Determine field compaction for any of the following conditions:
1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[e] To determine field compaction use:
1. In-place density measurements using the method specified in your QC plan.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

[f] 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.
[g] For adjusting the plant controller at the HMA plant.
[h] 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.
[i] Report only.
[j] 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 [a]	California Test 202	JMF ± tolerance [c]	JMF ± tolerance [c]	JMF ± tolerance [c]	JMF ± tolerance [c]
Sieve: 3/4" / 1/2" / 3/8"					
1/2": X [b] /					
3/8": / X /					
No. 4: / / X					
No. 8: X / X / X					
No. 200: X / X / X					
Sand equivalent (min) [d]	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (%, max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density) [e, f]	California Test 375	91–97	91–97	91–97	--
Stabilometer value (min)[d,]	California Test 366				
No. 4 and 3/8" gradings		30	30	--	--
1/2" and 3/4" gradings		37	35	23	--
Air void content (%) [d, g]	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Percent of crushed particles	California Test 205				
Coarse aggregate (%, min)					
One fractured face		90	25	--	90
Two fractured faces		75	--	90	75
Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.)					
One fractured face		70	20	70	90
Los Angeles Rattler (%, max)	California Test 211				
Loss at 100 rev.		12	--	12	12
Loss at 500 rev.		45	50	40	40
Fine aggregate angularity (%, min)[h]	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 (%) [i]	California Test 367				
No. 4 grading		65.0–75.0	65.0–75.0	Report only	--
3/8" grading		65.0–75.0	65.0–75.0		
1/2" grading		65.0–75.0	65.0–75.0		
3/4" grading		65.0–75.0	65.0–75.0		
Voids in mineral aggregate (% min) [i]	California Test 367				--

No. 4 grading 3/8" grading 1/2" grading 3/4" grading		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 [i] 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)[j] 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)[j] 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)[j]	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ration, %)[j]	California Test 371	70	70	--	--
Smoothness	Section 39-1.12	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge and must grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt rubber binder	Various	--	--	Section 92-1.01D(2) and section 39-1.02D	Section 92-1.01D(2) and section 39-1.02D
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

[a] The Engineer determines combined aggregate gradations containing RAP under California Test 367.
[b] "X" denotes the sieves the Engineer tests for the specified aggregate gradation.
[c] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[d] The Engineer reports the average of 3 tests from a single split sample.
[e] The Engineer determines field compaction for any of the following conditions:
1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[f] To determine field compaction, the Engineer uses:
1. California Test 308, Method A, to determine in-place density of each density core.
2. California Test 309 to determine the maximum theoretical density at the frequency specified

in California Test 375, Part 5C.
[g]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.
[h] 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.
[i] Report only.
[j]Applies to RAP substitution rate greater than 15 percent.

Replace the 1st paragraph of section 39-2.02B with:

01-20-12

Perform sampling and testing at the specified frequency for the quality characteristics shown in the following table:

Minimum Quality Control—Standard Construction Process

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA type			
			A	B	RHMA-G	OGFC
Aggregate gradation[a]	California Test 202	1 per 750 tons and any remaining part at the end of the project	JMF ± Tolerance[b]	JMF ± Tolerance[b]	JMF ± Tolerance[b]	JMF ± Tolerance[b]
Sand equivalent (min)[c]	California Test 217		47	42	47	--
Asphalt binder content (%)	California Test 379 or 382		JMF ± 0.45	JMF ± 0.45	JMF ± 0.50	JMF ± 0.50
HMA moisture content (%, max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	1.0
Field compaction (% max. theoretical density)[d,e]	QC plan	2 per business day (min.)	91–97	91–97	91–97	--
Stabilometer value (min)[c, f]	California Test 366	One per 4,000 tons or 2 per 5 business days, whichever is greater				
No. 4 and 3/8" gradings			30	30	--	--
1/2" and 3/4" gradings			37	35	23	--
Air void content (%)[c, g]	California Test 367		4 ± 2	4 ± 2	TV ± 2	--

Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants[h]	California Test 226 or 370	2 per day during production	--	--	--	--
Percent of crushed particles coarse aggregate (%, min) One fractured face Two fractured faces Fine aggregate (%, min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	As designated in the QC plan. At least once per project	 90 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
Flat and elongated particles (%, max by weight @ 5:1)	California Test 235		Report only	Report only	Report only	Report only
Fine aggregate angularity (%, min)	California Test 234		45	45	45	--
Voids filled with asphalt (%)[j] No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-3		 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min)[j] No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-2		 17.0 15.0 14.0 13.0	 17.0 15.0 14.0 13.0	 -- -- 18.0–23.0 [k] 18.0–23.0 [k]	--
Dust proportion[j]	LP-4					--

No. 4 and 3/8" gradings 1/2" and 3/4" gradings			0.9–2.0 0.6–1.3	0.9–2.0 0.6–1.3	Report only	
Smoothness	Section 39-1.12	--	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	Section 39-1.04C	--	--	1,500–4,000	1,500–4,000
Asphalt modifier	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Section 39-1.02D	Section 39-1.04C	--	--	Section 39-1.02D	Section 39-1.02D

[a] Determine combined aggregate gradation containing RAP under Laboratory Procedure LP-9.
[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[c] Report the average of 3 tests from a single split sample.
[d] Determine field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[e] California Test 375 is used to determine field compaction, except use:

1. In-place density measurements using the method specified in your QC plan is used instead of using the nuclear gauge specified in Part 4 of California Test 375
2. California Test 309 to determine the maximum theoretical density instead of determining maximum density as specified in Part 5 of California Test 375

[f] Alter California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 ± 5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F for a minimum of 2 hours and not more than 3 hours."
[g] Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
[h] For adjusting the plant controller at the HMA plant.
[i] The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.
[j] Report only if the adjustment for the asphalt binder content TV is less than or equal to ±0.3 percent from OBC value submitted on a *Contractor Hot Mix Asphalt Design Data* form.
[k] Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 5th paragraph of section 39-2.03A with:

01-20-12

The Engineer determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.2 foot and any layer is less than 0.20 foot.

Replace the 1st paragraph of section 39-3.02A with:

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 [a]	California Test 202	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]
Sand equivalent (min) [c]	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40	JMF ± 0.40
HMA moisture content (%, max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Stabilometer value (min) [c]	California Test 366				
No. 4 and 3/8" gradings		30	30	--	--
1/2" and 3/4" gradings		37	35	23	--
Percent of crushed particles	California Test 205				
Coarse aggregate (% min)					
One fractured face		90	25	--	90
Two fractured faces		75	--	90	75
Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.)					
One fractured face		70	20	70	90
Los Angeles Rattler (% max)	California Test 211				
Loss at 100 rev.		12	--	12	12
Loss at 500 rev.		45	50	40	40
Air void content (%) [c, d]	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min)[e]	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 (%) [f]	California Test 367				
No. 4 grading		65.0–75.0	65.0–75.0	Report only	--
3/8" grading		65.0–75.0	65.0–75.0		
1/2" grading		65.0–75.0	65.0–75.0		
3/4" grading		65.0–75.0	65.0–75.0		
Voids in mineral aggregate (% min) [f]	California Test 367				--

No. 4 grading 3/8" grading 1/2" grading 3/4" grading		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 [f] 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)[g] 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)[g] 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)[g]	California Test 371	120	120	--	--
Moisture susceptibility (tensile strength ration, %)[g]	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

[a] The Engineer determines combined aggregate gradations containing RAP under California Test 367.
[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[c] The Engineer reports the average of 3 tests from a single split sample.
[d] 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.
[e] 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.
[f] Report only.

[g] Applies to RAP substitution rate greater than 15 percent.

01-20-1

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:

01-20-12

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Method Construction Process

Quality characteristic	Test method	HMA type			
		A	B	RHMA-G	OGFC
Aggregate gradation [a]	California Test 202	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]
Sand equivalent (min) [c]	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF ± 0.45	JMF ± 0.45	JMF ± 0.50	JMF ± 0.50
HMA moisture content (%, max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Stabilometer value (min) [c, d]	California Test 366				
No. 4 and 3/8" gradings		30	30	--	--
1/2" and 3/4" gradings		37	35	23	--
Percent of crushed particles	California Test 205				
Coarse aggregate (% min)					
One fractured face		90	25	--	90
Two fractured faces		75	--	90	75
Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.)					
One fractured face		70	20	70	90
Los Angeles Rattler (% max)	California Test 211				
Loss at 100 rev.		12	--	12	12

Loss at 500 rev.		45	50	40	40
Air void content (%) [c, e]	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min)[f]	California Test 234	45	45	45	--
Flat and elongated particles (% max by weight @ 5:1)	California Test 235	Report only	Report only	Report only	Report only
Voids filled with asphalt (%) [g] No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-3	 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) [g] No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-2	 17.0 15.0 14.0 13.0	 17.0 15.0 14.0 13.0	 -- -- 18.0–23.0 [h] 18.0–23.0 [h]	--
Dust proportion [g] No. 4 and 3/8" gradings 1/2" and 3/4" gradings	LP-4	 0.9–2.0 0.6–1.3	 0.9–2.0 0.6–1.3	Report only	--
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

[a] The Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.
[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[c] The Engineer reports the average of 3 tests from a single split sample.
[d] Alter California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 ±5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F from 2 to 3 hours."
[e] The Engineer determines the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
[f] The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

[g] Report only if the adjustment for the asphalt binder content TV is less than or equal to ±0.3 percent from the OBC value submitted on a *Contractor Hot Mix Asphalt Design Data* form.
[h] Voids in mineral aggregate for RHMA-G must be within this range.

Replace "280 degrees F" in item 2 in the 6th paragraph of section 39-3.04 with:

01-20-12

285 degrees F

Replace "5,000" in the 5th paragraph of section 39-4.02C with:

02-22-13

10,000

Replace the 7th paragraph of section 39-4.02C with:

02-22-13

Except for RAP substitution rate of greater than 15 percent, the Department does not use results from California Test 371 to determine specification compliance.

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 reporting time allowance
			A	B	RHMA-G		
Aggregate gradation[a]	California Test 202	1 per 750 tons	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]	California Test 125	24 hours
Asphalt binder content (%)	California Test 379 or 382		JMF±0.40	JMF±0.40	JMF ±0.40	Loose mix behind paver See California Test 125	
Field compaction (% max. theoretical density)[c,d]	QC plan		92–96	92–96	91–96	QC plan	
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants[e]	California Test 226 or 370	2 per day during production	--	--	--	Stock-piles or cold feed belts	--
Sand equivalent (min)[f]	California Test 217	1 per 750 tons	47	42	47	California Test 125	24 hours
HMA moisture content (%,max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	Loose Mix Behind Paver See	24 hours

Stabilometer value (min)[f] 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 37	30 35	-- 23	California Test 125	48 hours
Air void content (%)[f,g]	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	As desig-nated in QC plan. At least once per project.	90 75 70	25 -- 20	-- 90 70	California Test 125	48 hours
Los Angeles Rattler (% max): Loss at 100 rev. Loss at 500 rev.	California Test 211		12 45	-- 50	12 40	California Test 125	
Fine aggregate angularity (% min)[h]	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 (%)[i] 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.)[i] 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[i] 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)[i] 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)[j] 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)[j]	California Test 371	1 per 10,000 tons or 1 per project whichever is greater	120	120	--	--	
Moisture susceptibility (tensile strength ratio, %)[j]	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_0	12-foot straight-edge, must-grind, and PI_0	12-foot straight-edge, must-grind, and PI_0	--	
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	--	--	--	1,500–4,000	Section 39-1.02D	24 hours
CRM	Section 39-1.02D	--	--	--	Section 39-1.02D	Section 39-1.02D	48 hours

[a] Determine combined aggregate gradation containing RAP under California Test 367.
[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[c] Determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[d] To determine field compaction use:

1. In-place density measurements using the method specified in your QC plan.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

[e] For adjusting the plant controller at the HMA plant.
[f] Report the average of 3 tests from a single split sample.
[g] Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
[h] 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.
[i] Report only.
[j] Applies to RAP substitution rate greater than 15 percent.

Replace the 8th paragraph of section 39-4.02C with:

01-20-12

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 reporting time allowance
			A	B	RHMA-G		
Aggregate gradation[a]	California Test 202	1 per 750 tons	JMF ± tolerance [b]	JMF ± tolerance [b]	JMF ± tolerance [b]	California Test 125	24 hours
Asphalt binder content (%)	California Test 379 or 382		JMF ±0.45	JMF ±0.45	JMF ±0.50	Loose mix behind paver See California Test 125	
Field compaction (% max. theoretical density)[c,d]	QC plan		92–96	92–96	91–96	QC plan	
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants[e]	California Test 226 or 370	2 per day during production	--	--	--	Stock-piles or cold feed belts	--
Sand equivalent (min) [f]	California Test 217	1 per 750 tons	47	42	47	California Test 125	24 hours
HMA moisture content (%,max)	California Test 226 or 370	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0	Loose Mix Behind Paver See	24 hours

Stabilometer value (min)[f,g] 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 37	30 35	-- 23	California Test 125	48 hours
Air void content (%)[f,h]	California Test 367		4 ± 2	4 ± 2	TV ± 2		
Percent of crushed particles coarse aggregate (% min.): One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.): One fractured face	California Test 205	As desig-nated in QC plan. At least once per project.	90 75 70	25 -- 20	-- 90 70	California Test 125	48 hours
Los Angeles Rattler (% max): Loss at 100 rev. Loss at 500 rev.	California Test 211		12 45	-- 50	12 40	California Test 125	
Fine aggregate angularity (% min)[i]	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 (%)[j]: No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-3		 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	 76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	Report only	LP-3	
Voids in mineral aggregate (% min.)[j]: No. 4 grading 3/8" grading 1/2" grading 3/4" grading	LP-2		 17.0 15.0 14.0 13.0	 17.0 15.0 14.0 13.0	 -- -- 18.0–23.0[k] 18.0–23.0[k]	LP-2	
Dust proportion[j]: No. 4 and 3/8" gradings 1/2" and 3/4" gradings	LP-4		 0.9–2.0 0.6–1.3	 0.9–2.0 0.6–1.3	Report only	LP-4	
Smoothness	Section 39-1.12	--	12-foot straight-edge, must-grind, and PI_0	12-foot straight-edge, must-grind, and PI_0	12-foot straight-edge, must-grind, and PI_0	--	
Asphalt rubber binder viscosity @ 375 °F, centipoises	Section 39-1.02D	--	--	--	1,500–4,000	Section 39-1.02D	24 hours
CRM	Section 39-1.02D	--	--	--	Section 39-1.02D	Section 39-1.02D	48 hours

[a] Determine combined aggregate gradation containing RAP under Laboratory Procedure LP-9.

[b] The tolerances must comply with the allowable tolerances in section 39-1.02E.

[c] Determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[d] California Test 375 is used to determine field compaction, except use:

1. In-place density measurements using the method specified in your QC plan instead of using the nuclear gauge specified in Part 4 of California Test 375
2. California Test 309 to determine the maximum theoretical density instead of determining maximum density as specified in Part 5 of California Test 375

[e] For adjusting the plant controller at the HMA plant.
[f] Report the average of 3 tests from a single split sample.
[g] Alter California Test 304, Part 2.B.2.c: "After compaction in the mechanical compactor, cool to 140 ± 5 °F by allowing the briquettes to cool at room temperature for 0.5 hour, then place the briquettes in the oven at 140 °F from 2 to 3 hours."
[h] Determine the bulk specific gravity of each lab-compacted briquette under California Test 308, Method A, and theoretical maximum specific gravity under California Test 309.
[i] The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.
[j] Report only if the adjustment for the asphalt binder content TV is less than or equal to ±0.3 percent from the OBC value submitted on a *Contractor Hot Mix Asphalt Design Data* form.
[k] Voids in mineral aggregate for RHMA-G must be within this range.

Replace the 1st sentence in the 1st paragraph of section 39-4.03B(2) with:

01-20-12

For aggregate gradation and asphalt binder content, the minimum ratio of verification testing frequency to quality control testing frequency is 1:5.

Replace the 2nd "and" in the 7th paragraph of section 39-4.03B(2) with:

01-20-12

or

Replace the 1st paragraph of section 39-4.04A with:

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 [a]							
	Sieve	3/4"	1/2"	3/8"					
1	1/2"	X [b]	--	--	0.05	California Test 202	JMF ± Tolerance [c]		
1	3/8"	--	X	--	0.05				
1	No. 4	--	--	X	0.05				
2	No. 8	X	X	X	0.10				
3	No. 200	X	X	X	0.15				
4	Asphalt binder content (%)				0.30	California Test 379 or 382	JMF±0.40	JMF±0.40	JMF ± 0.40
5	Field compaction (% max. theoretical density) [d, e]				0.40	California Test 375	92–96	92–96	91–96
	Sand equivalent (min) [f]					California Test 217	47	42	47
	Stabilometer value (min) [f] No. 4 and 3/8" gradings 1/2" and 3/4" gradings					California Test 366	 30 37	 30 35	 -- 23
	Air void content (%)[f, g]					California Test 367	4 ± 2	4 ± 2	TV ± 2
	Percent of crushed particles coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on No. 8 sieve.) One fractured face					California Test 205	 90 75 70	 25 -- 20	 -- 90 70
	HMA moisture content (%, max)					California Test 226 or 370	1.0	1.0	1.0
	Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.					California Test 211	 12 45	 -- 50	 12 40

	Fine aggregate angularity (% min)[h]		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) [i] 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 (%) [i] 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 [i] 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) [j] 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) [j] 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) [j]		California Test 371	120	120	--
	Moisture susceptibility (tensile strength ratio %)[j]		California Test 371	70	70	70
	Smoothness		Section 39-1.12	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0	12-foot straight-edge, must grind, and PI_0
	Asphalt binder		Various	Section 92	Section 92	Section 92

	Asphalt rubber binder		Various	--	--	Section 92-1.01D(2) and section 39-1.02D
	Asphalt modifier		Various	--	--	Section 39-1.02D
	CRM		Various	--	--	Section 39-1.02D

[a] The Engineer determines combined aggregate gradations containing RAP under California Test 367.
[b] "X" denotes the sieves the Engineer tests for the specified aggregate gradation.
[c] The tolerances must comply with the allowable tolerances in section 39-1.02E.
[d] The Engineer determines field compaction for any of the following conditions:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and less than 0.20 foot.2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[e] To determine field compaction, the Engineer uses:

1. California Test 308, Method A, to determine in-place density of each density core.
2. California Test 309 to determine the maximum theoretical density at the frequency specified in California Test 375, Part 5C.

[f] The Engineer reports the average of 3 tests from a single split sample.
[g] 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.
[h] 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.
[i] Report only.
[j] Applies to RAP substitution rate greater than 15 percent.

01-20-11

Replace the 3rd paragraph of section 39-4.04A with:

01-20-12

The Department determines the percent of maximum theoretical density from density cores taken from the final layer measured the full depth of the total paved HMA thickness if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate grading is used and the specified total paved thickness is at least 0.15 foot and any lager is less than 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 and any layer is less than 0.20 foot.

^^

40 CONCRETE PAVEMENT

01-20-12

Replace section 40-1.01C(4) with:

01-20-12

40-1.01C(4) Authorized Laboratory

Submit for authorization the name of the laboratory you propose to use for testing the drilled core specimens for air content.

Replace the paragraph in section 40-1.01C(8) with:

01-20-12

Submit a plan for protecting concrete pavement during the initial 72 hours after paving when the forecasted minimum ambient temperature is below 40 degrees F.

01-20-12

Delete "determined under California Test 559" in section 40-1.01C(9).

Replace the 2nd and 3rd paragraphs in section 40-1.01D(4) with:

01-20-12

The QC plan must include details of corrective action to be taken if any process is out of control. As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
   - 2.1. One point falls outside the suspension limit line
   - 2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent material.

Replace the 1st paragraph in section 40-1.01D(5) with:

01-20-12

Determine the minimum cementitious materials content. Use your value for minimum cementitious material content for *MC* in equation 1 and equation 2 of section 90-1.02B(3).

Replace the 1st sentence of the 3rd paragraph of section 40-1.01D(9) with:

01-20-12

Use a California profilograph to determine the concrete pavement profile.

Replace the title of the table in section 40-1.01D(13)(a) with:

01-20-12

Concrete Pavement Acceptance Testing

Replace the 2nd and 3rd paragraphs in section 40-1.01D(13)(a) with:

01-20-12

Pavement smoothness may be accepted based on the Department's testing. A single test represents no more than 0.1 mile.

Acceptance of modulus of rupture, thickness, dowel bar and tie bar placement, coefficient of friction, smoothness, and air content, does not constitute final concrete pavement acceptance.

01-20-12

Delete the 4th item of the list in the 2nd paragraph in section 40-1.01D(13)(c)(2).

Replace the 1st and 2nd items in the list in the 2nd paragraph in 40-1.01D(13)(d) with:

01-20-12

1. For tangents and horizontal curves having a centerline radius of curvature 2,000 feet or more, the PI_0 must be at most 2-1/2 inches per 0.1-mile section.
2. For horizontal curves having a centerline radius of curvature from 1,000 to 2,000 feet including concrete pavement within the superelevation transitions of those curves, the PI_0 must be at most 5 inches per 0.1-mile section.

Replace the 1st and 2nd variables in the equation in section 40-1.01D(13)(f) with:

01-20-12

n_c = Number of your quality control tests (minimum of 6 required)
n_v = Number of verification tests (minimum of 2 required)

Replace "Your approved third party independent testing laboratory" in the 4th paragraph of section 40-1.01D(13)(f) with:

01-20-12

The authorized laboratory

Replace the 2nd item in the 2nd paragraph of section 40-1.01D(13)(g):

01-20-12

2. One test for every 4,000 square yards of concrete pavement with tie bars or remaining fraction of that area. Each tie bar test consists of 2 cores with 1 on each tie-bar-end to expose both ends and allow measurement.

Replace section 40-1.01D(13)(h) with:

01-20-12

40-1.01D(13)(h) Bar Reinforcement

Bar reinforcement is accepted based on inspection before concrete placement.

Replace the paragraph in section 40-1.02B(2) with:

01-20-12

PCC for concrete pavement must comply with section 90-1 except as otherwise specified.

Replace the paragraphs in section 40-1.02D with:

01-20-12

Bar reinforcement must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, bar reinforcement must comply with section 52.

If the project is shown to be in high desert or any mountain climate regions, bar reinforcement must be one of the following:

1. Epoxy-coated bar reinforcement under section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Low carbon, chromium steel bar complying with ASTM A 1035/A 1035M

Replace the paragraphs in section 40-1.02E with:

01-20-12

Tie bars must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with either section 52-2.02B or 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02C, or section 52-2.03C.

Do not bend tie bars.

Replace the 1st, 2nd, and 3rd paragraphs in section 40-1.02F with:

01-20-12

Dowel bars must be plain bars. Fabricate, sample, and handle epoxy-coated dowel bars under ASTM D 3963/D 3963M and section 52-2.03C except each sample must be 18 inches long.

If the project is not shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with either section 52-2.02B or 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with section 52-2.03B.
2. Stainless-steel bars. Bars must be descaled, pickled, polished, and solid stainless-steel bars under ASTM A 955/A 955M, Grade 60, UNS Designation S31603 or S31803.

Replace the paragraphs in section 40-1.02G with:

01-20-12

For dowel and tie bar baskets, wire must comply with ASTM A 82/A 82M and be welded under ASTM A 185/A 185M, Section 7.4. The minimum wire-size no. is W10. Use either U-frame or A-frame shaped assemblies.

If the project is not shown to be in high desert or any mountain climate region. Baskets may be epoxy-coated, and the epoxy coating must comply with either section 52-2.02B or 52-2.03B.

If the project is shown to be in high desert or any mountain climate region, wire for dowel bar and tie bar baskets must be one of the following:

1. Epoxy-coated wire complying with section 52-2.03B
2. Stainless-steel wire. Wire must be descaled, pickled, and polished solid stainless-steel. Wire must comply with (1) the chemical requirements in ASTM A 276/A 276M, UNS Designation S31603 or S31803 and (2) the tension requirements in ASTM A 1022/ A 1022M.

Handle epoxy-coated tie bar and dowel bar baskets under ASTM D 3963/D 3963M and either section 52-2.02B or 52-2.03B.

Fasteners must be driven fasteners under ASTM F 1667. Fasteners on lean concrete base or HMA must have a minimum shank diameter of 3/16 inch and a minimum shank length of 2-1/2 inches. For asphalt treated permeable base or cement treated permeable base, the shank diameter must be at least 3/16 inch and the shank length must be at least 5 inches.

Fasteners, clips, and washers must have a minimum 0.2-mil thick zinc coating applied by either electroplating or galvanizing.

Replace the 1st paragraph in section 40-1.02H with:

01-20-12

Chemical adhesive for drilling and bonding dowels and tie bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for the concrete temperature and installation conditions.

Replace section 40-1.02I(2) with:

01-20-12

40-1.02I(2) Silicone Joint Sealant

Silicone joint sealant must be on the Authorized Material List.

Replace the last sentence in section 40-1.02I(4) with:

01-20-12

Show evidence that the seals are compressed from 30 to 50 percent for the joint width at time of installation.

Replace the paragraph in section 40-1.02L with:

01-20-12

Water for core drilling may be obtained from a potable water source, or submit proof that it does not contain:

1. More than 1,000 parts per million of chlorides as Cl
2. More than 1,300 parts per million of sulfates as $S0_4$
3. Impurities that cause pavement discoloration or surface etching

Replace the paragraph in section 40-1.03B with:

01-20-12

Before placing concrete pavement, develop enough water supply for the work under section 17.

Replace the last paragraph in section 40-1.03D(1) with:

01-20-12

Removal of grinding residue must comply with section 42-1.03B.

Replace the 1st and 2nd paragraphs in section 40-1.03E(6)(c) with:

01-20-12

Install preformed compressions seals in isolation joints if specified in the special provisions.

Install longitudinal seals before transverse seals. Longitudinal seals must be continuous except splicing is allowed at intersections with transverse seals. Transverse seals must be continuous for the entire transverse length of concrete pavement except splices are allowed for widenings and staged construction. With a sharp instrument, cut across the longitudinal seal at the intersection with transverse construction joints. If the longitudinal seal does not relax enough to properly install the transverse seal, trim the longitudinal seal to form a tight seal between the 2 joints.

If splicing is authorized, splicing must comply with the manufacturer's written instructions.

Replace the last 2 paragraphs in section 40-1.03G with:

01-20-12

Construct additional test strips if you:

1. Propose different paving equipment including:
   1.1. Paver
   1.2. Dowel bar inserter
   1.3. Tie bar inserter
   1.4. Tining
   1.5. Curing equipment
2. Change concrete mix proportions

You may request authorization to eliminate the test strip if you use paving equipment and personnel from a Department project (1) for the same type of pavement and (2) completed within the past 12 months. Submit supporting documents and previous project information with your request.

Replace the 1st paragraph in section 40-1.03I with:

01-20-12

Place tie bars in compliance with the tolerances shown in the following table:

Tie Bar Tolerance

Dimension	Tolerance
Horizontal and vertical skew	10 degrees maximum
Longitudinal translation	± 2 inch maximum
Horizontal offset (embedment)	± 2 inch maximum
Vertical depth	1. Not less than 1/2 inch below the saw cut depth of joints 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom

Replace item 4 in the 2nd paragraph in section 40-1.03I with:

01-20-12

4. Use tie bar baskets. Anchor baskets at least 200 feet in advance of pavement placement activity. If you request a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before paving, demonstrate the tie bars do not move from their specified depth and alignment during paving. Use fasteners to anchor tie bar baskets.

Replace "The maximum distance below the depth shown must be 0.05 foot." in the table in section 40-1.03J with:

01-20-12

The maximum distance below the depth shown must be 5/8 inch.

Replace sections 40-1.03L and 40-1.03M with:

01-20-12

40-1.03L Finishing

40-1.03L(1) General

Reserved

40-1.03L(2) Preliminary Finishing

40-1.03L(2)(a) General

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day's paving with a stamp. The stamp must be authorized before paving starts. The stamp must be approximately 1 by 2 feet in size. The stamp must form a uniform mark from 1/8 to 1/4 inch deep. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the pavement's outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement's outside edge.

Do not apply more water to the pavement surface than can evaporate before float finishing and texturing are completed.

40-1.03L(2)(b) Stationary Side Form Finishing

If stationary side form construction is used, give the pavement a preliminary finish by the machine float method or the hand method.

If using the machine float method:

1. Use self-propelled machine floats.

2. Determine the number of machine floats required to perform the work at a rate equal to the pavement delivery rate. If the time from paving to machine float finishing exceeds 30 minutes, stop pavement delivery. When machine floats are in proper position, you may resume pavement delivery and paving.
3. Run machine floats on side forms or adjacent pavement lanes. If running on adjacent pavement, protect the adjacent pavement surface under section 40-1.03P. Floats must be hardwood, steel, or steel-shod wood. Floats must be equipped with devices that adjust the underside to a true flat surface.

If using the hand method, finish pavement smooth and true to grade with manually operated floats or powered finishing machines.

40-1.03L(2)(c) Slip-Form Finishing

If slip-form construction is used, the slip-form paver must give the pavement a preliminary finish. You may supplement the slip-form paver with machine floats.

Before the pavement hardens, correct pavement edge slump in excess of 0.02 foot exclusive of edge rounding.

40-1.03L(3) Final Finishing

After completing preliminary finishing, round the edges of the initial paving widths to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Construct longitudinal grooves with a self-propelled machine designed specifically for grooving and texturing pavement. The machine must have tracks to maintain constant speed, provide traction, and maintain accurate tracking along the pavement surface. The machine must have a single row of rectangular spring steel tines. The tines must be from 3/32 to 1/8 inch wide, on 3/4-inch centers, and must have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep. The machine must have horizontal and vertical controls. The machine must apply constant down pressure on the pavement surface during texturing. The machines must not cause ravels.

Construct grooves over the entire pavement width in a single pass except do not construct grooves 3 inches from the pavement edges and longitudinal joints. Final texture must be uniform and smooth. Use a guide to properly align the grooves. Grooves must be parallel and aligned to the pavement edge across the pavement width. Grooves must be from 1/8 to 3/16 inch deep after the pavement has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand-construct grooves under section 40-1.03L(2) using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Initial and final texturing must produce a coefficient of friction of at least 0.30 when tested under California Test 342. Notify the Engineer when the pavement is scheduled to be opened to traffic to allow

at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is ready for testing which is the latter of:

1. Seven days after paving
2. When the pavement has attained a modulus of rupture of 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

40-1.03M Reserved

Replace the 4th paragraph of 40-1.03P with:

01-20-12

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.

Replace the 1st paragraph of section 40-6.01A with:

01-20-12

Section 40-6 includes specifications for applying a high molecular weight methacrylate resin system to pavement surface cracks that do not extend the full slab depth.

Replace the 4th paragraph of section 40-6.01C(2) with:

01-20-12

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.

01-20-12

Delete the 1st sentence of the 2nd paragraph in section 40-6.02B.

Replace the 4th item in the last paragraph in section 40-6.03A with:

01-20-12

4. Coefficient of friction is at least 0.30 under California Test 342

Replace the paragraph in section 40-6.04 with:

01-20-12

Not Used

Add to section 40:

01-20-12

40-7–40-15 RESERVED

^^

DIVISION VI STRUCTURES

46 GROUND ANCHORS AND SOIL NAILS

04-19-13

Replace the 1st paragraph of section 46-1.01C(2) with:

04-19-13

Submit 5 copies of shop drawings to OSD, Documents Unit. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal. Allow 30 days for the Department's review. After review, submit from 6 to 12 copies, as requested, for authorization and use during construction.

Shop drawings and calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

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

01-18-13

Ground anchor shop drawings must include:

1. Details and specifications for the anchorage system and ground anchors.
2. Details for the transition between the corrugated plastic sheathing and the anchorage assembly.
3. If shims are used during lock-off, shim thickness and supporting calculations.
4. Calculations for determining the bonded length. Do not rely on any capacity from the grout-to-ground bond within the unbonded length.

01-18-13

Delete the 5th and 6th paragraphs of section 46-1.01C(2).

Replace the 4th paragraph of section 46-1.01D(2)(b) with:

01-18-13

Each jack and its gage must be calibrated as a unit under the specifications for jacks used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength in section 50-1.01D(3).

10-19-12

Delete the 3rd paragraph of section 46-1.01D(2)(d).

Add to section 46-1.03B:

04-20-12

Dispose of drill cuttings under section 19-2.03B.

Replace the 1st sentence of the 3rd paragraph of section 46-2.01A with:

04-20-12

Ground anchors must comply with section 50.

Add to section 46-2.02B:

04-20-12

Strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50.

^^

DIVISION VI STRUCTURES

47 EARTH RETAINING SYSTEMS

02-17-12

Replace the 2nd paragraph of section 47-2.01D with:

02-17-12

Coupler test samples must comply with minimum tensile specifications for steel wire in ASTM A 82/A 82M. Total wire slip must be at most 3/16 inch when tested under the specifications for tension testing of round wire test samples in ASTM A 370.

Replace "78-80" in the 1st table in the 2nd paragraph of section 47-2.02C with:

10-19-12

78-100

Replace the value for the sand equivalent requirement in the table titled "Property Requirements" in the 3rd paragraph of section 47-2.02C with:

01-20-12

12 minimum

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.

Add between the 2nd and 3rd paragraphs of section 47-3.02A:

10-19-12

Reinforcement must comply with section 52.

10-19-12

Delete the 1st paragraph of section 47-3.02B(2)(b).

Add between the 3rd and 4th paragraphs of section 47-5.01:

10-19-12

Reinforcement must comply with section 52.

Add to section 47-6.01A:

10-19-12

The alternative earth retaining system must comply with the specifications for the type of wall being constructed.

Replace "sets" at each occurrence in the 1st paragraph of section 47-6.01C with:

04-19-13

copies

^^

48 TEMPORARY STRUCTURES

04-19-13

Replace "previously welded splice" and its definition in section 48-2.01B with:

04-19-13

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

Delete "field" in the 1st sentence of the 5th paragraph of section 48-2.01C(1).

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 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

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.

^^

49 PILING

04-19-13

Replace "sets" in the 1st paragraph of section 49-1.01C(2) with:

04-19-13

copies

Replace "set" in the 2nd paragraph of section 49-1.01C(2) with:

04-19-13

copy

Replace "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" in the 5th paragraph of section 49-1.01D(2) with:

07-20-12

"Tensile Load Applied by Hydraulic Jack(s) Acting Upward at One End of Test Beam(s)"

Add to section 49-1.03:

04-20-12

Dispose of drill cuttings under section 19-2.03B.

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 "sets" in the 1st paragraph of section 49-2.04A(3) with:

04-19-13

copies

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.

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 1st paragraph of section 49-3.02A(3)(g) with:

01-20-12

2. Be sealed and signed by an engineer who is registered as a civil engineer in the State. This requirement is waived for either of the following conditions:
   2.1 The proposed mitigation will be performed under the current Department-published version of *ADSC Standard Mitigation Plan 'A' - Basic Repair* without exception or modification.
   2.2 The Engineer determines that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and you elect to repair the pile using the current Department-published version of *ADSC Standard Mitigation Plan 'B' - Grouting Repair* without exception or modification.

Replace item 1 in the 1st paragraph of section 49-3.02A(4)(d)(ii) with:

01-20-12

1. Inspection pipes must be schedule 40 PVC pipe complying with ASTM D 1785 with a nominal pipe size of 2 inches. Watertight PVC couplers complying with ASTM D 2466 are allowed to facilitate pipe lengths in excess of those commercially available. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.

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

01-20-12

If the Engineer determines it is not feasible to use one of ADSC's standard mitigation plans to mitigate the pile, schedule a meeting and meet with the Engineer before submitting a nonstandard mitigation plan.

The meeting attendees must include your representatives and the Engineer's representatives involved in the pile mitigation. The purpose of the meeting is to discuss the type of pile mitigation acceptable to the Department.

Provide the meeting facility. The Engineer conducts the meeting.

Replace the 1st paragraph of section 49-3.02B(5) with:

01-20-12

Grout used to backfill casings must comply with section 50-1.02C, except:

1. Grout must consist of cementitious material and water, and may contain an admixture if authorized. Cementitious material must comply with section 90-1.02B, except SCMs are not required. The minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.
2. Aggregate must be used to extend the grout as follows:
   2.1 Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
   2.2 Fine aggregate must comply with section 90-1.02C(3).
   2.3 Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 90 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
3. California Test 541 is not required.
4. Grout is not required to pass through a sieve with a 0.07-inch maximum clear opening before being introduced into the grout pump.

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 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.

^^

50 PRESTRESSING CONCRETE

04-19-13

Replace "sets" at each occurrence in the 2nd and 3rd paragraphs of section 50-1.01C(3) with:

04-19-13

copies

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 6th paragraph of section 50-1.01D(3) with:

01-18-13

Jacking equipment must be calibrated as follows:

1. Each jack and its gage must be calibrated as a unit.
2. 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:
   - 2.1. Schedule the calibration of the jacking equipment with METS
   - 2.2. Verify that the jack and supporting systems are complete, with proper components, and are in good operating condition
   - 2.3. Mechanically calibrate the gages with a dead weight tester or other authorized means before calibration of the jacking equipment by METS
   - 2.4. Provide enough labor, equipment, and material to (1) install and support the jacking and calibration equipment and (2) remove the equipment after the calibration is complete
   - 2.5. Plot the calibration results
3. 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.

Replace "diameter" in item 9 in the list in the 1st paragraph of section 50-1.02D with:

04-20-12

cross-sectional area

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
1. Have a minimum wall thickness of 0.025 inch
2. 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.

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.

Add to section 50-1.03B(2):

09-16-11

50-1.03B(2)(e) Debonding Prestressing Strands

Where shown, debond prestressing strands by encasing the strands in plastic sheathing along the entire length shown and sealing the ends of the sheathing with waterproof tape.

Distribute the debonded strands symmetrically about the vertical centerline of the girder. The debonded lengths of pairs of strands must be equal.

Do not terminate debonding at any one cross section of the member for more than 40 percent of the debonded strands or 4 strands, whichever is greater.

Thoroughly seal the ends with waterproof tape to prevent the intrusion of water or cement paste before placing the concrete.

^^

51 CONCRETE STRUCTURES

04-19-13

Replace the paragraphs of section 51-1.01A with:

10-19-12

Section 51-1 includes general specifications for constructing concrete structures.

Earthwork for the following concrete structures must comply with section 19-3:

1. Sound wall footings
2. Sound wall pile caps
3. Culverts
4. Barrier slabs
5. Junction structures
6. Minor structures
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 the heading of section 51-1.01D(4) with:

04-19-13

Testing Concrete Surfaces

Add to section 51-1.01D(4)(a):

04-19-13

The Engineer tests POC deck surfaces for smoothness and crack intensity.

Add to the list in the 1st paragraph of section 51-1.01D(4)(b):

04-19-13

3. Completed deck surfaces, including ramps and landings of POCs

Replace the 4th paragraph in section 51-1.01D(4)(b) with:

04-19-13

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.

Add between the 5th and 6th paragraphs of section 51-1.01D(4)(b):

04-19-13

POC deck surfaces must comply with the following smoothness requirements:

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.

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:

04-19-13

copies

Replace "set" in the 7th paragraph of section 51-2.02D(1)(c)(ii) with:

04-19-13

copy

Add to the 1st paragraph of section 51-2.02D(3):

04-19-13

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

Replace "sets" in the 2nd paragraph of section 51-2.02E(1)(c) with:

04-19-13

copies

Replace "set" in the 6th paragraph of section 51-2.02E(1)(c) with:

04-19-13

copy

Replace the 2nd paragraph of section 51-2.02E(1)(e) with:

08-05-11

Except for components in contact with the tires, the design loading must be the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. Each component in contact with the tires must support a minimum of 80 percent of the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. The tire contact area must be 10 inches measured normal to the longitudinal assembly axis by 20 inches wide. The assembly must provide a smooth-riding joint without slapping of components or tire rumble.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02F(1)(c) with:

04-19-13

copies

Add between the 1st and 2nd paragraphs of section 51-4.01A:

10-19-12

Prestressing concrete members must comply with section 50.

04-20-12

Delete the 2nd paragraph of section 51-4.01A.

Replace the 3rd paragraph of section 51-4.01C(2) with:

04-20-12

For segmental or spliced-girder construction, shop drawings must include the following additional information:

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:

04-19-13

Copies

10-19-12

Delete the 1st and 2nd paragraphs of section 51-4.02A.

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 between the 1st and 2nd paragraphs of section 51-7.01A:

10-19-12

Minor structures include:

1. Pipe culvert headwalls and endwalls for a pipe with a diameter less than 5 feet
2. Drainage inlets
3. Other structures described as minor structures

10-19-12

Delete the 4th paragraph of section 51-7.01A.

Replace the 1st and 2nd paragraphs of section 51-7.01B with:

10-19-12

Concrete must comply with the specifications for minor concrete.

Add to section 51:

10-19-12

51-8–51-15 RESERVED

^^

52 REINFORCEMENT

01-18-13

Add to section 52-1.01A:

07-20-12

Splicing of bar reinforcement must comply with section 52-6.

Replace the 1st and 2nd paragraphs of section 52-1.02B with:

10-19-12

Reinforcing bars must be deformed bars complying with ASTM A 706/A 706M, Grade 60, except you may use:

1. Deformed bars complying with ASTM A 615/A 615M, Grade 60, in:
   - 1.1. Junction structures
   - 1.2. Sign and signal foundations
   - 1.3. Minor structures

1.4. Concrete crib members
1.5. Mechanically-stabilized-embankment concrete panels
1.6. Masonry block sound walls

2. Deformed or plain bars complying with ASTM A 615/A 615M, Grade 40 or 60, in:
   2.1. Slope and channel paving
   2.2. Concrete barriers Type 50 and 60
3. Plain bars for spiral or hoop reinforcement in structures and concrete piles

Add to the list in the 3rd paragraph of section 52-1.02B:

04-20-12

9. Shear reinforcement stirrups in PC girders

Replace the 6th paragraph of section 52-6.01D(4)(a) with:

01-18-13

Before performing service splice or ultimate butt splice testing, perform total slip testing on the service splice or ultimate butt splice test samples under section 52-6.01D(4)(b).

Replace section 52-6.02D with:

Replace section 52-6.02D with:

10-21-11

52-6.02D Ultimate Butt Splice Requirements

When tested under California Test 670, ultimate butt splice test samples must demonstrate necking as either of the following:

1. For "Necking (Option I)," the test sample must rupture in the reinforcing bar outside of the affected zone and show visible necking.
2. For "Necking (Option II)," the largest measured strain must be at least:
   2.1 Six percent for no. 11 and larger bars
   2.2 Nine percent for no. 10 and smaller bars

Replace the 2nd and 3rd paragraphs of section 52-6.03B with:

01-18-13

Do not splice the following by lapping:

1. No. 14 bars

2. No. 18 bars
3. Hoops
4. Reinforcing bars where you cannot provide a minimum clear distance of 2 inches between the splice and the nearest adjacent bar

^^

54 WATERPROOFING

04-20-12

Add between "be" and "3/8 inch" in the 3rd paragraph of section 54-4.02C:

04-20-12

at least

^^

55 STEEL STRUCTURES

04-19-13

Replace "sets" at each occurrence in the 1st paragraph of section 55-1.01C(2) with:

04-19-13

copies

^^

56 SIGNS

04-19-13

07-20-12

Delete item 2 in the list in the 4th paragraph of section 56-3.01A.

Replace "sets" in the 1st paragraph of section 56-3.01C(2) with:

04-19-13

Copies

07-20-12

Delete the 7th paragraph of section 56-3.02K(2).

07-20-12

Delete item 4 in the list in the 1st paragraph of section 56-3.02M(1).

Replace item 5 in the list in the 1st paragraph of section 56-3.02M(1) with:

04-19-13

Tubular

Add between the 1st and 2nd paragraphs of section 56-3.02M(1):

04-19-13

Clean and paint all ferrous metal parts of tubular sign structures after galvanizing, including the areas to be covered by sign panels. Do not paint sign structures other than tubular type unless specified in the special provisions.

Replace the headings and paragraphs in section 56-3.02M(3) with:

04-19-13

Where specified, clean and paint sign structures under section 59-5.

07-20-12

Delete "and box beam-closed truss" in the 2nd paragraph of section 56-3.02M(3)(a).

^^

57 WOOD AND PLASTIC LUMBER STRUCTURES

04-19-13

Replace "51-2.01C(3)" in the 1st paragraph of section 57-2.01C(3)(a) with:

10-19-12

57-2.01C(3)

Replace "sets" at each occurrence in the 1st paragraph of section 57-3.01C with:

04-19-13

copies

^^^

58 SOUND WALLS

04-19-13

10-19-12

Delete the 3rd paragraph of section 58-1.01.

Replace the 1st paragraph of section 58-2.01D(5)(a) with:

08-05-11

You must employ a special inspector and an authorized laboratory to perform Level 1 inspections and structural tests of masonry to verify the masonry construction complies with section 1704, "Special Inspections," and section 2105, "Quality Assurance," of the 2007 CBC.

Delete the 1st paragraph of section 58-2.02F.

Replace "sets" at each occurrence in the 1st paragraph of section 58-4.01C with:

04-19-13

copies

^^

59 PAINTING

04-19-13

Replace "SSPC-SP 10" at each occurrence in section 59 with:

10-19-12

SSPC-SP 10/NACE no. 2

Replace "SSPC-SP 6" at each occurrence in section 59 with:

10-19-12

SSPC-SP 6/NACE no. 3

Replace "SSPC-CS 23.00" at each occurrence in section 59 with:

10-19-12

SSPC-CS 23.00/AWS C 2.23M/NACE no. 12

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:

10-19-12

AISC-420-10/SSPC-QP 3 (Enclosed Shop)

Replace the paragraphs in section 59-2.03A with:

10-19-12

Clean and paint all exposed structural steel and other metal surfaces.

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.

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)
All new surfaces:		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat[a]	Exterior grade latex[b], 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14
Connections to existing structural steel:[c]		
Undercoat	Inorganic zinc primer, AASHTO M 300 Type I or II	4–8
Finish coat[a]	Exterior grade latex[b], 2 coats	2 minimum each coat, 4–8 total
Total thickness, all coats		8–14

[a]If no finish coats are described, a final coat of inorganic zinc primer is required.
[b]Exterior grade latex must comply with section 91-2.02 unless otherwise specified.
[c]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

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:

State Specification PWB Coating System

Surface	Description	State Specification PWB Coating	Dry film thickness (mils)
Surfaces cleaned to bare metal[a]:	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

[a]Includes locations of spot blast cleaning

59-2.03C(4)(b) Finish Coats

Pressure rinse undercoated surfaces to receive finish coats. Perform pressure rinsing no sooner than 72 hours after the final application of undercoat.

The 1st finish coat must be applied within 48 hours of pressure rinsing.

Apply the 1st finish coat in 2 applications. The 1st application consists of a spray-applied mist application. Apply the 2nd application after the mist application has dried to a set-to-touch condition as determined using the procedure in section 7 of ASTM D 1640.

Apply the 2nd finish coat after the 1st finish coat has dried 12 hours unless authorized. You may apply the 2nd finish coat in a single application.

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 "solider" in the 5th paragraph of section 59-9.03 with:

04-19-13

soldier

^^

DIVISION VII DRAINAGE

62 ALTERNATIVE CULVERTS

10-19-12

Add to the end of section 62-1.01:

10-19-12

Alternative culverts include concrete collars and concrete tees and reinforcement for connecting new pipe to existing or new facilities. Concrete for the collars and tees must be minor concrete. Reinforcement for the concrete collars or tee connections must comply with section 52.

^^^

64 PLASTIC PIPE

10-19-12

Replace the 2nd paragraph of section 64-1.01A with:

10-19-12

Plastic pipe includes all necessary elbows, wyes, tees, other branches, fittings, coupling systems, concrete collars or tees, and reinforcement.

^^^

65 CONCRETE PIPE

10-19-12

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.

^^

DIVISION VII DRAINAGE

70 MISCELLANEOUS DRAINAGE FACILITIES

01-18-13

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 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.

^^^

DIVISION VIII MISCELLANEOUS CONSTRUCTION

72 SLOPE PROTECTION

Replace the row under "Class" in the table titled "Concreted-Rock Grading" in section 72-3.02B with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble

Replace the row under "Rock class" in the table titled "Minimum Concrete Penetration" in section 72-3.03E with:

01-20-12

1/2 T	1/4 T	Light	Facing	Cobble

Add to section 72-11.01B:

01-18-13

Expanded polystyrene and premolded expansion joint filler must comply with section 51-2.

Replace the 1st paragraph of section 72-11.01C(2) with:

01-18-13

Construct and finish minor concrete slope paving under section 51-1.

^^

74 PUMPING EQUIPMENT AND CONTROLS

04-19-13

Replace the 1st paragraph of section 74-1.01C(3) with:

04-19-13

Submit at least 5 copies of product data to OSD, Documents Unit. Each copy must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two copies will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

Replace the 1st sentence of the 1st paragraph in section 74-2.01D(2) with:

01-20-12

Drainage pumps must be factory certified under ANSI/HI 14.6.

^^

75 MISCELLANEOUS METAL

04-19-13

Add between 2nd and 3rd paragraphs of section 75-1.03A:

04-19-13

Fabricate expansion joint armor from steel plates, angles, or other structural shapes. Shape the armor to the section of the concrete deck and match-mark it in the shop. Bevel the unbolted end of the checkered plate at 45 degrees. Straighten warped sections of expansion joint armor before placing. Secure the expansion joint armor in the correct position during concrete placement.

Replace "SSPC-QP 3" in the 3rd paragraph of section 75-1.03E(4) with:

10-19-12

AISC-420-10/SSPC-QP3

^^

Replace section 78 with:

07-20-12

78 INCIDENTAL CONSTRUCTION

07-20-12

78-1 GENERAL

Section 78 includes specifications for incidental bid items that are not closely associated with other sections.

78-2–78-50 RESERVED

^^

80 FENCES

10-19-12

Add to section 80-2.02D:

10-19-12

Vertical stays must:

1. Comply with ASTM A641
2. Be 12-1/2 gage
3. Have a Class 3 zinc coating

Replace item 1 in the list in section 80-2.02E with:

10-19-12

Comply with ASTM A 116, Type Z, Grade 60, Class 1

Add after "galvanized wire" in the 1st paragraph of section 80-2.02F:

10-19-12

complying with ASTM A 641

Replace the 3rd and 4th paragraphs of section 80-2.02F with:

10-19-12

Each staple used to fasten barbed wire and wire mesh fabric to wood posts must:

1. Comply with ASTM F 1667
2. Be at least 1-3/4 inches long
3. Be manufactured from 9-gage galvanized wire

Wire ties used to fasten barbed wire and wire mesh to metal posts must be at least 11-gage galvanized wire complying with ASTM F 626. Clips and hog rings used for metal posts must be at least 9-gage galvanized wire complying with ASTM F 626.

Replace the 8th through 14th paragraphs of section 80-2.03 with:

10-19-12

Attach the wire mesh and barbed wire to each post.

Securely fasten tension wires to wood posts. Make a single or double loop around each post at each attachment point and staple the wire to the post. Use wire ties, hog rings, or wire clips to fasten the wires to the metal posts.

Connect each wood brace to its adjacent post with a 3/8 by 4-inch steel dowel. Twist the tension wires until the installation is rigid.

Stretch barbed wire and wire mesh fabric and fasten to each wood or steel end, corner, or gate post. Apply tension according to the manufacturer's instructions using a mechanical stretcher or other device designed for such use. If no tension is specified by the manufacturer, use 250 pounds for the required tension. Evenly distribute the pull over the longitudinal wires in the wire mesh such that no more than 50 percent of the original depth of the tension curves is removed. Do not use a motorized vehicle, truck, or tractor to stretch the wire.

Attach barbed wire and wire mesh fabric to the private-property side of posts. On curved alignments, place the wire mesh and barbed wire on the face of the post against which the normal pull of the wire mesh and wire will be exerted. Terminate the wire mesh and barbed wire at each end, corner, pull, and gate post in the new fence line. Attach wire mesh and barbed wire to each wood or steel end, corner, pull, or gate post by wrapping each horizontal strand around the post and tying it back on itself with at least 4 tightly-wound wraps.

At line posts, fasten the wire mesh to the post at the top and bottom and at intermediate points not exceeding 10 inches apart. Fasten each line of barbed wire to each line post. Use wire ties or clips to fasten the wires to metal posts under the post manufacturer's instructions. Drive staples crosswise with the grain of the wood and pointed slightly downward. Drive staples just short of actual contact with the wires to allow free longitudinal movement of those wires and to prevent damage to the wire's protective coating. Secure all wires to posts to maintain horizontal alignment.

Splices in barbed wire and wire mesh are allowed provided there are no more than 2 splices per 50 feet of fence. Use commercially-available galvanized mechanical wire splices or a wire splice created by tying off wire. Install mechanical wire splices with a tool designed for that purpose under the manufacturer's instructions. Tie off the wire as follows:

1. Carry the ends of each wire 3 inches past the tied-off knot location and wrap around the wire for at least 6 turns in opposite directions.
2. Remove the splice tool and close the space by pulling the end of the wires together.
3. Cut the unused ends of the wire close and neat.

Add to "≤ 6" in the table in the 4th paragraph of section 80-3.02B:

10-19-12

feet

^^^

DIVISION IX TRAFFIC CONTROL FACILITIES

83 RAILINGS AND BARRIERS

10-19-12

Replace "80-2.02" in the 2nd paragraph of section 83-1.02E with:

10-19-12

80-3.02B

Add to section 83-2.02D(1):

10-21-11

For a concrete barrier transition:

1. Remove portions of the existing concrete barrier where shown under section 15-3
2. Roughen the contact surface of the existing concrete barrier
3. Drill and bond dowels into the existing concrete barrier under section 51-1

Add to section 83-2.02:

10-19-12

83-2.02H–83-2.02M Reserved

^^

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

01-20-12

Replace the 1st paragraph in section 84-2.04 with:

01-20-12

A double extruded thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 2 traffic stripes.

A double sprayable thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 1 traffic stripe.

Add to section 84:

01-20-12

84-6 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS WITH ENHANCED WET NIGHT VISIBILITY

Reserved

84-7–84-10 RESERVED

^^

86 ELECTRICAL SYSTEMS

10-19-12

Replace section 86-2.06 with:

01-20-12

86-2.06 PULL BOXES

86-2.06A General

86-2.06A(1) Cover Marking

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-Rated Pull Boxes

Reserved

86-2.06C Traffic Pull Boxes

Traffic pull box and cover must comply with ASTM C857, "Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures," for HS20-44 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 "project" in the 3rd paragraph of section 86-2.11A with:

10-19-12

work

Replace "Contract" in item 2 in the list in the 11th paragraph of section 86-2.11A with:

10-19-12

work

^^

88 GEOSYNTHETICS

01-18-13

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.

01-20-12

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	ASTM D 4632	200	250

min, in each direction			
Apparent elongation, percent min, in each direction	ASTM D 4632	10	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	100-200	75-200
Permittivity, sec^{-1} min	ASTM D 4491	1.0	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

Replace the table in the 1st paragraph of section 88-1.02H with:

01-20-12

Temporary Cover

Property	Test	Values	
		Woven	Nonwoven
Grab breaking load, lb, 1-inch grip min, in each direction	ASTM D 4632	200	200
Apparent elongation, percent min, in each direction	ASTM D 4632	15	50
Water flow rate, gal per minute/sq ft min and max average roll value	ASTM D 4491	4-10	80-120
Permittivity, sec^{-1} min	ASTM D 4491	0.05	1.0
Apparent opening size, inches max average roll value	ASTM D 4751	0.023	0.012
Ultraviolet resistance, % min retained grab breaking load, 500 hr.	ASTM D 4355	70	70

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[a] 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[a] min	ASTM D 6637	410 x 620
Tensile strength at ultimate, lb/ft[a] 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[a] 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[b] min	GRI:GG9	0.65

[a]Machine direction x cross direction
[b]Geosynthetic Research Institute, Test Method GG9, *Torsional Behavior of Bidirectional Geogrids When Subjected to In-Plane Rotation*

^^

DIVISION X MATERIALS

90 CONCRETE

08-05-11

Replace the 3rd paragraph of section 90-1.01C(7) with:

08-05-11

Submit weighmaster certificates in printed form or, if authorized, in electronic media. Present electronic media in a tab-delimited format on a CD or DVD. Captured data for the ingredients represented by each batch must be line feed carriage return and one line separate record with sufficient fields for the specified data.

Replace the 3rd paragraph of section 90-3.01C(5) with:

08-05-11

Production data must be input by hand into a pre-printed form or captured and printed by the proportioning device. Present electronic media containing recorded production data in a tab-delimited format on a CD or DVD. Each capture of production data must be followed by a line feed carriage return with sufficient fields for the specified data.

^^

91 PAINT

10-19-12

Add to section 91-2:

10-19-12

91-2.03 MOISTURE-CURED POLYURETHANE COATING

Reserved

Replace "saint" in the 1st paragraph of section 91-4.05 with:

10-19-12

paint

^^

92 ASPHALTS

01-20-12

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

5 MODIFICATIONS TO SPECIAL PROVISIONS

5.1 General

The following non-Standard Special Provisions (nSSP) listed in this Section 5 shall be used when the item specified is included in the work for this Project.

5.2 Draft nSSPs

The following nSSPs are in draft format and shall be edited by the Design-Builder according to the instructions in the hidden text included in the nSSP, and the guidelines given in the Department's Ready-To-List Guide. Once edits are complete, the nSSP shall be submitted to the Department for review and approval.

Edits to these nSSPs within the limits of what is allowed by the hidden text instructions of the nSSP will require up to two weeks for each review by the Department. Edits beyond what is allowed by the hidden text instructions will require up to four weeks for each review.

The Design Builder shall bear the risk of schedule impacts associated with nSSP reviews. Once approved for use, each approved nSSP shall follow the same process as Standard Special Provisions (SSPs) for inclusion in RFC packages, except that written notice of approval shall accompany the nSSP.

1. Section 14-11.09 "Treated Wood Waste" – Replace existing Standard Spec and RSS
2. Section 39 "Hot Mix Asphalt Pavement" – Replace existing Standard Spec and RSS
3. Piezo-Electric Axle Sensor

5.3 Approved nSSPs

The following nSSPs are pre-approved for use on this project. These nSSPs shall follow the same process as Standard Special Provisions (SSPs) for inclusion in RFC packages.

4 Section 14-11.07 "Remove Yellow Traffic Stripe and Pavement Marking with Hazardous Waste Residue" – Replace existing Standard Spec and RSS
5 Section 31 "Remove Traffic Stripes and Pavement Markings Containing" – Replace existing Standard Spec and RSS
6 Section 28 "Concrete Bases" – Replace existing Standard Spec and RSS
7 Section 31 "Base Bond Breaker" – New Section
8 Section 40 "Concrete Pavement" – Replace existing Standard Spec and RSS
9 Section 41 "Concrete Pavement Repair" – Replace existing Standard Spec and RSS
10 Section 88-1.02Q "Geosynthetic Bond Breaker" – Use with nSSP Section 31
11 Section 90-6 "Roller Compacted Conrete" – Use with nSSP Sections 28 and 40.

1. TREATED WOOD WASTE

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 _____ is TWW. Manage TWW under 22 CA Code of Regs, Div. 4.5, Chp. 34.

14-11.09A(2) Submittals

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

14-11.09B Materials

Not Used

14-11.09C Construction

14-11.09C(1) General

14-11.09C(2) Training

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

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

Maintain records of personnel training for 3 years.

14-11.09C(3) Storage

Store TWW before disposal using the following methods:

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

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

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

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

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

14-11.09C(4) Transporting and Disposal

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

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

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

2. HOT MIX ASPHALT PAVEMENT

Replace section 39 with:

39 HOT MIX ASPHALT, SUPERPAVE

39-1.01 GENERAL

39-1.01A Summary

Section 39 includes specifications for producing and placing HMA by mixing aggregate and asphalt binder at a mixing plant and spreading and compacting the HMA mixture.

HMA includes one or more of the following types:

1. HMA, superpave (HMA-SP) Type A
2. RHMA, superpave, gap graded (RHMA-SP-G)
3. OGFC including HMA-O, and RHMA-O

The RSSs for section 39 do not apply.

39-1.01B Definitions

coarse aggregate: Aggregate retained on a 1/4-inch screen

fine aggregate: Aggregate passing the 1/4-inch screen.

leveling course: Thin layer of HMA used to correct minor variations in the longitudinal and transverse profile of the pavement before placement of other pavement layers.

lower course: HMA-SP (Type A) layers below 0.2 feet from finished grade

miscellaneous areas: Areas outside the traveled way such as:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Gutter flares
6. Ditches
7. Overside drains
8. Aprons at the ends of drainage structures

modified binder: PG graded binder designated as polymer modified (PM) or terminal blend (TR), or any PG grade binder with rubber modifiers.

processed RAP: RAP that has been fractioned.

supplemental fine aggregate: Aggregate passing the no. 30 sieve, including hydrated lime, portland cement, and fines from dust collectors.

surface course: Upper 0.2 feet of HMA-SP (Type A) exclusive of HMA-O or RHMA-O.

top layer: Final riding surface exclusive of OGFC.

39-1.01C Submittals

39-1.01C(1) General

For miscellaneous areas and dikes, a JMF submittal is not required.

For JMF mix design, JMF verification, production start-up, and each 10,000 tons, submit AASHTO T 283 and AASHTO T 324 (Modified) test results to the Engineer and electronically to:

Moisture_Tests@dot.ca.gov

At production start-up and within 1000 tons of the halfway point of production of HMA, submit samples split from your HMA production sample for AASHTO T 283 and AASHTO T 324 (Modified) tests to the Engineer and the Transportation Laboratory, Attention: Moisture Test.

Submit quality control test results within 2 days of a request.

For tests performed under AASHTO T324 (Modified) as specified in section 39-1.01D(1), submit test data and 1 tested sample set within 72 hours of sampling.

39-1.01C(2) Job Mix Formula

39-1.01C(2)(a) General

For each type of HMA shown, submit your proposed JMF on the *Contractor Job Mix Formula Proposal* form along with:

1. Mix design documentation on *Hot Mix Asphalt Design Data* form dated within 12 months of submittal
2. MSDS for:
   - 2.1. Asphalt binder
   - 2.2. Base asphalt binder used in asphalt rubber binder
   - 2.3. CRM and asphalt modifier used in asphalt rubber binder
   - 2.4. Blended asphalt rubber binder mixture
   - 2.5. Supplemental fine aggregate except fines from dust collectors
   - 2.6. Antistrip additives
3. For RHMA-G-SP, asphalt rubber binder design and profile

The JMF must be based on a HMA mix design determined as described in the *Superpave Mix Design* SP-2 Manual by the Asphalt Institute.

Allow the Engineer 5 business days from a complete JMF submittal for document review of the aggregate qualities, mix design, and JMF. Do not start HMA production before verification and acceptance of JMF.

Submit a new JMF if you change any of the following:

1. Target asphalt binder percentage greater than ±0.2 percent
2. Asphalt binder supplier
3. Asphalt rubber binder supplier
4. Component materials used in asphalt rubber binder or percentage of any component materials
5. Combined aggregate gradation
6. Aggregate sources
8. Any material in the JMF

Submit a new JMF when the average binder content in a new fractionated RAP stockpile is more than ± 2.0 percent from the average binder content of the original fractionated RAP stockpile used in the mix design.

Submit a new JMF when the processed RAP specific gravity is more than ± 0.060 from the average maximum specific gravity reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form.

39-1.01C(2)(b) Mix Design

The HMA mix design must comply with AASHTO R 35 except:

1. Notes 3, 6, and 10 do not apply

2. AASHTO M 323 does not apply on combinations of aggregate gradations and asphalt binder contents to determine the OBC and HMA mixture qualities

Your Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

For HMA mixtures utilizing RAP the maximum binder replacement is 25.0 percent for surface course and 40.0 percent for lower courses.

For HMA with a binder replacement percent less than or equal to 25 percent of optimum binder content, you may request that the performance graded asphalt binder grade with upper and lower temperature classifications be reduced by 6 °C from the specified grade.

For HMA with a binder replacement greater than 25 percent of optimum binder content and less than or equal to 40 percent of optimum binder content, you must use a performance graded asphalt binder grade with upper and lower temperature classifications reduced by 6 °C from the specified grade.

The mix design must comply with the quality characteristics of the following table:

Hot Mix Asphalt Mix Design Requirements

Quality characteristic	Test method	HMA-SP	
		Type A	RHMA-SP-G
Air voids content (%)	AASHTO T 269[a]	$N_{initial}$ >8.0 N_{design} = 4.0 N_{max} >2.0	N_{design} Specification
Gyration Compaction (number of gyrations)	AASHTO T 312	$N_{initial}$ 8 N_{design} 85 N_{max} 130	N_{design} 50–150
Voids in mineral aggregate (% min.) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[b]	 18.0 16.0 14.5 13.5	 -- -- 19.0–24.0 19.0–24.0
Voids filled with asphalt (%) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[b]	 65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report Only
Dust proportion 1/4" and 3/8" gradings 1/2" and 3/4" gradings	SP-2 Asphalt Mixtures Volumetrics[b]	 0.9–2.0 0.6–1.3	Report Only
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) PG 58 PG 64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)[c, d]	 10,000 15,000 20,000 25,000	 15,000 20,000 25000
Hamburg wheel track (inflection point minimum number of passes)[f] PG 58 PG 64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)[c, d]	 10,000 10,000 12,500 15000	 10,000 10,000 12,500
Moisture susceptibility (minimum dry strength, psi)	AASHTO T 283[c]	120	120
Moisture susceptibility (tensile strength ration, %)	AASHTO T 283[ce]	70	70

[a]Calculate the air voids content of each specimen using AASHTO T 275 to determine bulk specific gravity AASHTO T 209 Method A to determine theoretical maximum specific gravity. Under AASHTO T 209 use a digital monometer and pycnometer when performing AASHTO T 209.
[b]Measure bulk specific gravity using AASHTO T 275.
[c]Test plant produced HMA.
[d]Test as specified in section 39-1.01D(1).
[e]Freeze thaw required

If the test results for AASHTO T 283 or AASHTO T 324 (Modified) for untreated plant produced HMA is less than minimum requirements for HMA-mix design, determine the plasticity index of the aggregate blend under California Test 204. The antistrip treatment must be based on plasticity index in compliance with the following table:

Hot Mix Asphalt Antistrip Treatment Options

Quality characteristic	Test method	Treatment requirement
Plasticity index		Dry hydrated lime with marination
Plasticity index from 4 to 10[a]		Lime slurry with marination
	California Test 204	Liquid
Plasticity index less than 4		Dry hydrated lime without marination Dry hydrated lime with marination Lime slurry with marination

[a]If the plasticity index is greater than 10, do not use that aggregate blend.

If the tensile strength ratio test result for treated plant produced RHMA-SP-G is less than the RHMA-SP-G mix design requirement for tensile strength ratio, the minimum tensile strength ratio requirement is waived, but you must use any of the following antistrip treatments:

1. HMA aggregate lime treatment – slurry method
2. HMA aggregate lime treatment – dry lime method
3. Liquid antistrip treatment using 0.5 percent liquid antistrip

39-1.01C(2)(c) Liquid Antistrip Treatment

If liquid antistrip (LAS) treatment is used, submit the following with your proposed JMF submittal:

1. MSDS for LAS.
2. One 1-pint sample.
3. Infrared analysis including copy of absorption spectra.
4. Certified copy of test results and an MSDS for each LAS lot.
5. Certificate of compliance for each LAS shipment. With each certificate of compliance, include:
   - 5.1. Your signature and printed name.
   - 5.2. Shipment number
   - 5.3. Material type.
   - 5.4. Material specific gravity
   - 5.5. Refinery.
   - 5.6. Consignee.
   - 5.7. Destination.
   - 5.8. Quantity.
   - 5.9. Contact or purchase order number.
   - 5.10. Shipment date
6. Proposed proportions for LAS. If you change the brand or type of LAS, submit a new JMF.

For each job site delivery of LAS, submit one 1/2-pint sample to METS. Submit shipping documents. Label each LAS sampling container with:

1. LAS type
2. Application rate
3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow sufficient fields for the specified data. Include data titles at least once per report. For each mixing operation type, submit the following items in order:

1. Batch mixing:
    - 1.1. Production date
    - 1.2. Time of batch completion
    - 1.3. Mix size and type
    - 1.4. Each ingredient's weight
    - 1.5. Asphalt binder content as a percentage of the dry aggregate weight
    - 1.6. LAS content as a percentage of the asphalt binder weight
2. Continuous mixing
    - 2.1. Production date
    - 2.2. Data capture time
    - 2.3. Mix size and type
    - 2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
    - 2.5. Aggregate moisture content as percentage of the dry aggregate weight
    - 2.6. Flow rate of asphalt binder collected from the asphalt binder meter
    - 2.7. Flow rate of LAS collected from the LAS meter
    - 2.8. Asphalt binder content as percentage of the dry aggregate weight calculated from:
        - 2.8.1. Aggregate weigh belt output
        - 2.8.2. Aggregate moisture input
        - 2.8.3. Asphalt binder meter output
    - 2.9. LAS content as percentage of the asphalt binder weight calculated from:
        - 2.9.1. Asphalt binder meter output
        - 2.9.2. LAS meter output

39-1.01C(2)(d) Lime Treatment

If aggregate lime treatment is used, submit the following with your proposed JMF:

1. Exact lime proportions for fine and coarse virgin aggregate with the proposed JMF
2. If marination is required, the averaged aggregate quality test results within 24 hours of sampling
3. For dry lime aggregate treatment, a treatment data log from the dry lime and aggregate proportioning device in the following order:
    - 3.1 Treatment date
    - 3.2. Time of day the data is captured
    - 3.3 Aggregate size being treated
    - 3.4. HMA type and mix aggregate size
    - 3.5. Wet aggregate flow rate collected directly from the aggregate weigh belt
    - 3.6. Aggregate moisture content, expressed as a percent of the dry aggregate weight
    - 3.7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
    - 3.8. Dry lime flow rate
    - 3.9. Lime ratio from the accepted JMF for each aggregate size being treated
    - 3.10. Lime ratio from the accepted JMF for the combined aggregate
    - 3.11. Actual lime ratio calculated from the aggregate weigh belt output, the aggregate moisture input, and the dry lime meter output, expressed as a percent of the dry aggregate weight
    - 3.12. Calculated difference between the authorized lime ratio and the actual lime ratio
4. For lime slurry aggregate treatment, a treatment data log from the slurry proportioning device in the following order:
    - 4.1. Treatment date
    - 4.2. Time of day the data is captured
    - 4.3. Aggregate size being treated
    - 4.4. Wet aggregate flow rate collected directly from the aggregate weigh belt

4.5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
4.6. Dry aggregate flow rate calculated from the wet aggregate flow rate
4.7. Lime slurry flow rate measured by the slurry meter
4.8. Dry lime flow rate calculated from the slurry meter output
4.9. Authorized lime ratio for each aggregate size being treated
4.10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
4.11. Calculated difference between the authorized lime ratio and the actual lime ratio
4.12. Dry lime and water proportions at the slurry treatment time

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

39-1.01C(2)(e) Asphalt Rubber Binder

For the asphalt rubber binder used, submit:

1. Log of production daily.
2. Certificate of compliance with test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. The certificate of compliance for asphalt modifier must represent no more than 5,000 lbs.
3. Submit certified weight slips for the CRM and asphalt modifier furnished.

Submit a certificate of compliance for the asphalt rubber binder. With the certificate of compliance, submit test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. A certificate of compliance for asphalt modifier must not represent more than 5,000 lbs.

39-1.01C(2)(f) Reclaimed Asphalt Pavement

Submit QC test results for RAP gradation with the combined aggregate gradation within 2 days of taking RAP samples during HMA-SP (Type A) production.

39-1.01C(3) Quality Control Plan

With your proposed JMF submittal, submit a QC plan for HMA. The QC plan must describe the organization and procedures for:

1. Controlling HMA quality characteristics
2. Obtaining samples, including sampling locations
3. Establishing, implementing, and maintaining QC
2. Determining when corrective actions are needed
3. Implementing corrective actions
4. Taking samples, including location of sampling

The QCP must address the elements affecting HMA quality including:

1. Aggregate
2. Asphalt binder
3. Additives
4. Production
5. Paving

The QC plan must include aggregate quality control sampling and testing during lime treatment.

The Engineer reviews the QC plan within 5 business days from the submittal. Do not start HMA production until the Engineer authorizes the plan.

If QC procedures, personnel, tester qualifications, or lab accreditation status change, submit a QC plan supplement at least 3 business days before implementing proposed changes.

39-1.01C(4) Profilograms

Submit final profilograms including 1 electronic copy of profile information in Microsoft Excel and 1 electronic copy of longitudinal pavement profiles in ".erd" format or other ProVAL compatible format to the Engineer and to:

Smoothness@dot.ca.gov

39-1.01C(5) Data Cores

At least 3 business days before starting coring, submit proposed methods and materials for backfilling data core holes.

Submit a summary of data cores taken and a photograph of each data core to the Engineer and to:

Coring@dot.ca.gov

39-1.01D Quality Control and Assurance

39-1.01D(1) General

AASHTO T 324 (Modified) is AASHTO T 324, "Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA)," with the following parameters:

1. Target air voids must equal 7 ± 1 percent
2. Number of test specimens must be 4
3. Test specimen must be a 6-inch gyratory compacted specimen
4. Test temperature must be set at 140 ± 2 degrees F
5. Measurements for impression must be taken at every 100 passes
6. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
7. Testing shut off must be set at 20,000 passes

During production, take samples under California Test 125.

If the Engineer requests, sample the following materials in the presence of the Engineer and place in labeled containers weighing no more than 50 lbs. each:

1. Coarse, fine, and supplemental fine aggregate from stockpiles, cold feed belts, or hot bins. Samples must include at least 120 lbs. for each coarse aggregate, 80 lbs. for each fine aggregate, and 10 lbs. for each type of supplemental fines. The Department combines these aggregate samples to comply with the JMF target values submitted on *Contractor Job Mix Formula Proposal* form.
2. RAP from stockpiles or RAP system. Samples must be at least 100 lbs.
3. Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical shaped cans with open top and friction lids.
4. Asphalt rubber binder with the components blended in the proportions to be used. Samples must be in four 1-quart cylindrical shaped cans with open top and friction lids.

Notify the Engineer at least 2 business days before sampling materials. For aggregate and RAP, split the samples into at least 4 parts. Submit 3 parts to the Engineer and use 1 part for your testing.

39-1.01D(2) Verification and Acceptance of Job Mix Formula

For OGFC, the Engineer determines the asphalt binder content under California Test 368 within 20 days of your complete JMF submittal and provides you a *Hot Mix Asphalt Verification* form.

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.

Asphalt binder set point for HMA verification 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:

$$\text{Asphalt Binder Set Point} = \frac{\dfrac{BC_{OBC}}{\left(1 - \dfrac{BC_{OBC}}{100}\right)} - R_{RAP}\left[\dfrac{BC_{RAP}}{\left(1 - \dfrac{BC_{RAP}}{100}\right)}\right]}{100 + \dfrac{BC_{OBC}}{\left(1 - \dfrac{BC_{OBC}}{100}\right)}}$$

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

For HMA, the Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. Notify the Engineer at least 2 business days before sampling materials.

In the Engineer's presence and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from cold feed belts or hot bins. Sample RAP from the RAP system.

You may sample from a different project including a non-Department project if you make arrangements for the Engineer to be present during sampling.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts to the Engineer and use 1 part for your testing.

The Engineer verifies each proposed JMF within 20 days of receiving verification samples. Verification is testing for compliance with the specifications for:

1. Aggregate quality
2. Aggregate gradation (JMF TV ± tolerance)
3. Asphalt binder content (JMF TV ± tolerance)
4. HMA quality specified in the table Hot Mix Asphalt Mix Design Requirements except:
   4.1. Air voids content (design value ± 1.5 percent)
   4.2. VMA (minimum HMA mix design requirement +3.0 -1.0)
   4.3. Dust proportion (design value +/- 0.5)

To verify the JMF air voids content the Engineer uses an average of three briquettes for air voids content, VMA, VFA, and Dust Proportion The Engineer tests plant produced material.

If the Engineer verifies the JMF, the Engineer provides you a *Hot Mix Asphalt Verification* form.

If the Engineer's 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:

1. Asphalt binder content target value up to ±0.2 percent from the OBC value submitted on *Hot Mix Asphalt Design Data* form except do not adjust the target value for asphalt rubber binder for RHMA-G-SP below 7.5 percent by total weight of mixture.
2. Aggregate gradation target values within the target value limits specified in the aggregate gradation table.

You may adjust the JMF only once due to a failed verification test. An adjusted JMF requires a new *Contractor Job Mix Formula Proposal* form and *Hot Mix Asphalt Design Data* form and verification of a plant-produced sample.

The Engineer reverifies the JMF if HMA production has stopped for longer than 30 days and the verified JMF is older than 12 months.

For each HMA type and aggregate size specified, the Engineer verifies up to 2 proposed JMF submittals including a JMF adjusted after verification failure. If you submit more than 2 JMF for each type of HMA and aggregate size, the Engineer deducts $3,000 from payments for each verification exceeding this limit. This deduction does not apply to verifications initiated by the Engineer or if a JMF expires while HMA production is stopped longer than 30 days.

If you have a verified *Hot Mix Asphalt Verification* form, the Engineer will verify 1 binder source change for each HMA type and aggregate size specified. The Engineer deducts $2,000 from payments for this verification.

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

39-1.01D(2) Quality Control Plan

Implement your QC plan. If a change to your QC plan is needed, do not implement the change without authorization.

39-1.01D(3) Prepaving Conference

Meet with the Engineer at a prepaving conference at a mutually agreed time and place. Discuss the QC plan and the methods of performing production and paving work.

The following personnel must attend the prepaving conference:

1. Project Manager
2. Superintendent
3. HMA plant manager
4. HMA paving foreman

39-1.01D(4) Quality Control Testing

Perform sampling and testing as specified in the following 4 tables:

Minimum Quality Control Requirements for Aggregate

Quality characteristic	Test method	Minimum sampling and testing frequency	HMA-SP		
			Type A	RHMA-SP-G	OGFC
Aggregate gradation[a]	AASHTO T 27	1 per 750 tons and any remaining part	JMF ± Tolerance[b]	JMF ± Tolerance[b]	JMF ± Tolerance[b]
Sand equivalent (min.)[c]	AASHTO T 176		47	47	--
Aggregate moisture content at continuous mixing plants and RAP moisture content at continuous mixing plants and batch mixing plants	AASHTO T 329	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	AASHTO T 335	One per 10,000 tons or 2 per project which-ever is more	 95 90 70	 -- 90 70	 90 90 90
Los Angeles Rattler (%, max.) Loss at 100 rev. Loss at 500 rev.	AASHTO T 96		 12 40	 12 40	 12 40
Flat and elongated particles (%, max. by weight @ 5:1)	ASTM D 4791		Report only	Report only	Report only
Fine aggregate angularity (%, min.)	AASHTO T 304, Method A		45	45	--

[a]If RAP is used, test the combined aggregate gradation under Laboratory Procedure LP-9.
[b]Comply with the allowable tolerances in section 39-1.02E.
[c]Report the average of 3 tests from a single split sample. Use of a Sand Reader Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

Minimum Quality Control Requirements for in Place HMA

Quality Characteristic	Test method	Minimum sampling and testing frequency	HMA-SP		
			Type A	RHMA-SP-G	OGFC
Asphalt binder content (%)	AASHTO T 308 Method A	1 per 750 tons and any remaining part	JMF - 0.3, + 0.5	JMF - 0.4, + 0.5	JMF - 0.4, + 0.5
HMA moisture content (%, max.)	AASHTO T 329	1 per 2,500 tons but not less than 1 per paving day	1.0	1.0	1.0
Air voids content (%)[a]	AASHTO T 269	One per 4,000 tons or 2 per 5 business days, which-ever is more	4 ± 1.5	Specification ± 1.5	--
Voids filled with asphalt (%) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[a]	One per 10,000 tons or 2 per project which-ever is more	 65.0–75.0 65.0–75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min.) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[a]		 16.5 14.5 13.5 12.5	 -- -- 18.0–23.0 18.0–23.0	--
Dust proportion 1/4" and 3/8" gradings 1/2" and 3/4" gradings	SP-2 Asphalt Mixtures Volumetrics[a]		 0.9–2.0 0.6–1.3	Report only	--

[a]Determine bulk specific gravity using AASHTO T 275.

Minimum Quality Control Requirements for in Place HMA

Quality Characteristic	Test method	Minimum sampling and testing frequency	HMA-SP		
			Type A	RHMA-SP-G	OGFC
Percent of theoretical maximum density (%) by core[a, b]	California Test 375	2 per paving day (min.)	92–97	92–97	--
Percent of theoretical maximum density by Nuclear gauge (%)[a, b, c]	California Test 375	3 per 250 tons but not less than 3 per paving day	92–97	92–97	--
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth) PG 58 PG 64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)[d]	One per 10,000 tons or 1 per project which-ever is more	10,000 15,000 20,000 25,000	15,000 20,000 25,000 --	--
Hamburg wheel track (inflection point minimum number of passes)[e] PG 58 PG 64 PG-70 PG-76 or higher	AASHTO T 324 (Modified)[d]		10,000 10,000 12,500 15,000	10,000 12,500 15,000 --	--
Moisture susceptibility (minimum dry strength, psi)	AASHTO T 283	One per 10,000 tons or 1 per project which-ever is more	120	120	--
Moisture susceptibility (tensile strength ratio, %)[e]	AASHTO T 283		70	70	--

[a]Determine theoretical maximum density if any of the following applies:

1. 1/2-inch, 3/8-inch, or 1/4-inch 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.

[b]Determine theoretical maximum density under AASHTO T 209 Method A at the frequency specified for Test Maximum Density in California Test 375, Part 5.D. Use a digital manometer and a pycnometer when performing AASHTO T 209.

[c]Verify gauge correlation to cores every 10,000 tons utilizing the average of two cores.

[d]Test as specified in section 39-1.01D(1).

[e]Freeze thaw required.

Miscellaneous Minimum Quality Control Requirements

Quality Characteristic	Test method	Minimum sampling and testing frequency	HMA		
			Type A	RHMA-SP-G	OGFC
Smoothness	California Test 526	--	12-foot straightedge, must-grind, and PI_0	12-foot straightedge, must-grind, and PI_0	12-foot straightedge and must-grind
Asphalt rubber binder viscosity @ 375 °F (centipoises)	LP-11	Once per hour, minimum of 1 test per batch	--	1,500 – 4,000	1,500 – 4,000
Asphalt modifier	ASTM D 445 ASTM D 92 ASTM D 2007	1 per truckload delivered to the RHMA-G-SP production facility	--	Section 39-1.02D(2)(b)	Section 39-1.02D(2)(b)
Crumb rubber modifier	LP-10 CT 208 ASTM D 297	1 per truckload delivered to the RHMA-G-SP production facility	--	Section 39-1.02D(2)(c)	Section 39-1.02D(2)(c)

Prepare 3 briquettes for air voids content and VMA determination. Report the average of 3 tests.

For any quality characteristic except smoothness, if any 2 quality control test results for 1 day's production do not comply with the specifications:

1. Notify the Engineer
2. Take corrective action
3. Show how you will comply with the specifications before resuming production and placement on the State highway

For any quality characteristic except smoothness, if any 3 quality control test results for 1 day's production do not comply with the specifications:

1. Stop production
2. Notify the Engineer
3. Take corrective action
4. Show how you will comply with the specifications before resuming production and placement on the State highway

39-1.01D(5) Asphalt Rubber Binder

Take asphalt rubber binder samples from the feed line connecting the asphalt rubber binder tank to the HMA plant. Sample and test asphalt rubber binder under Laboratory Procedure LP-11. Use an AASHTO-certified laboratory for testing.

Test asphalt rubber binder for compliance with the viscosity requirements in section 39-1.02D(2)(b). During asphalt rubber binder production and HMA production using asphalt rubber binder, measure viscosity every hour with not less than 1 reading for each asphalt rubber binder batch. Log measurements

with corresponding time and asphalt rubber binder temperature. Sample and test gradation and wire and fabric content of CRM once per 10,000 lbs. of scrap tire CRM and once per 3,400 lbs. of high natural CRM. Sample and test scrap tire CRM and high natural CRM separately.

39-1.01D(6) Aggregate

Laboratories testing aggregate qualities and preparing the mix design and JMF must be qualified under AASHTO Materials Reference Laboratory program (AMRL), and the Department's Independent Assurance Program. Take samples under California Test 125.

Determine the aggregate moisture content moisture content in continuous mixing plants at least twice a day during production and adjust the plant controller.

39-1.01D(7) Reclaimed Asphalt Pavement

Sample and test processed RAP at a minimum frequency of 1 sample per 1000 tons with a minimum of 6 samples per fractionated stockpile to assure that its asphalt binder content and specific gravity meet the processed RAP quality characteristics. If a fractionated RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

The quality characteristic for processed RAP asphalt binder content must be within ± 2.0 percent of the average fractionated RAP stockpile asphalt binder content when tested under ASTM D 2172 (Method B). If new fractionated RAP stockpiles piles are required, the average binder content of the new fractionated RAP stockpile must be within ± 2.0 percent of the average binder content of the original fractionated RAP stockpile.

The quality characteristic for maximum specific gravity for processed RAP, must be within ± 0.06 when tested under AASHTO T 209, of the average maximum specific gravity reported on page 4 of your *Contractor Hot Mix Asphalt Design Data* form.

During production, sample RAP twice daily and perform QC testing for:

1. Aggregate gradation at least once a day under Laboratory Procedure LP-9
2. Moisture content at least twice a day during and adjust the plant controller

39-1.01D(8) Liquid Antistrip Treatment

For continuous mixing and batch mixing operations, sample asphalt binder before adding LAS. For continuous mixing operations, sample combined asphalt binder and LAS after the static mixer.

39-1.01D(9) Aggregate Lime Treatment

For lime slurry aggregate treatment and dry lime aggregate treatment with marination, sample and test before treatment at the minimum frequencies shown in the following table:

Aggregate Quality Control During Lime Treatment

Quality characteristic	Test method	Minimum sampling and testing frequency
Sand equivalent	AASHTO T 176	Once per 750 tons of untreated aggregate
Percent of crushed particles	AASHTO T 335	One per 10,000 tons or 2 per project whichever is more
Los Angeles Rattler	AASHTO T 96	
Fine aggregate angularity	AASHTO T 304 method A	
Flat and elongated particles	ASTM D4791	

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

For lime slurry aggregate treatment, determine the aggregate moisture content at least once during each 2 hours of treatment. Calculate moisture content under AASHTO T 329 and report it as a percent of dry aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

39-1.01D(10) Production Start-up Evaluation

The Engineer evaluates HMA production and placement at production start-up.

Within the first 750 tons produced on the first day of HMA production, in the Engineer's presence and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from cold feed belts or hot bins. Take RAP samples from the RAP system. Sample HMA under California Test 125. You must identify your sampling location in your Quality Control Plan.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 split parts to the Engineer and keep 1 part.

You and the Engineer must test the split samples and report test results within 3 business days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

Take 4-inch or 6-inch diameter density cores within the first 750 tons on the first day of HMA production. For each density core, the Engineer reports the bulk specific gravity determined under AASHTO T 275, Method A in addition to the percent of theoretical maximum density. You must test for in-place density at the density core locations and include them in your production tests for percent of theoretical maximum density.

39-1.01D(11) Nuclear Gauge Density

During HMA placement determine HMA density using a nuclear gauge. On the 1st day of production, develop a correlation factor between cores and nuclear gauge under California Test 375. Take a minimum of 3 nuclear gauge density readings for every 250 tons of HMA placed at random locations you select.

39-1.01D(12) Smoothness

39-1.01D(12)(a) General

Determine HMA smoothness with a profilograph and a straightedge.

Smoothness specifications do not apply to OGFC placed on existing pavement not constructed under the same project.

If portland cement concrete is placed on HMA-SP (Type A):

1. Cold plane the HMA-SP (Type A) finished surface to within specified tolerances if it is higher than the grade specified by the Engineer.
2. Remove and replace HMA-SP (Type A) if the finished surface is lower than 0.05 foot below the grade specified by the Engineer.

39-1.01D(12)(b) Straightedge

The HMA pavement top layer must not vary from the lower edge of a 12-foot long straightedge:

1. More than 0.01 foot when the straight edge is laid parallel with the centerline
2. More than 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. More than 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

39-1.01D(12)(c) Profilographs

Under California Test 526, determine the zero (null) blanking band Profile Index (PI_0) and must-grinds on the top layer of HMA-SP (Type A), and RHMA-SP-G pavement. Take 2 profiles within each traffic lane, 3 feet from and parallel with the edge of each lane.

A must-grind is a deviation of 0.3 inch or more in a length of 25 feet. You must correct must-grinds.

For OGFC, only determine must-grinds when placed over HMA constructed under the same project. The top layer of the underlying HMA must comply with the smoothness specifications before placing OGFC.

Profile pavement in the Engineer's presence. Choose the time of profiling.

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.

Before the Engineer accepts HMA pavement for smoothness, submit written final profilograms.

The following HMA pavement areas do not require a $PI_{0.}$ You must measure these areas with a 12-foot straightedge and determine must-grinds with a profilograph:

1. New HMA with a total thickness less than 0.25 foot
2. HMA sections of city or county streets and roads, turn lanes and collector lanes that are less than 1,500 feet in length

The following HMA pavement areas do not require a $PI_{0.}$ You must measure these areas with a 12-foot straightedge:

1. Horizontal curves with a centerline radius of curvature less than 1,000 feet including pavement within the superelevation transitions of those curves
2. Within 12 feet of a transverse joint separating the pavement from:
   - 2.1. Existing pavement not constructed under the same project
   - 2.2. A bridge deck or approach slab

3. Exit ramp termini, truck weigh stations, and weigh-in-motion areas
4. If steep grades and superelevation rates greater than 6 percent are present on:
   4.1. Ramps
   4.2. Connectors
5. Turn lanes
6. Areas within 15 feet of manholes or drainage transitions
7. Acceleration and deceleration lanes for at-grade intersections
8. Shoulders and miscellaneous areas
9. HMA pavement within 3 feet from and parallel to the construction joints formed between curbs, gutters, or existing pavement

39-1.01D(12)(d) Smoothness Corrections

If the top layer of HMA-SP (Type A) or RHMA-SP-G pavement does not comply with the smoothness specifications, grind the pavement to within tolerances, remove and replace it, or place a layer of HMA. The Engineer must authorize your choice of correction before the work begins.

Remove and replace the areas of OGFC not in compliance with the must-grind and straightedge specifications, except you may grind OGFC for correcting smoothness:

1. At a transverse joint separating the pavement from pavement not constructed under the same project
2. Within 12 feet of a transverse joint separating the pavement from a bridge deck or approach slab

Corrected HMA pavement areas must be uniform rectangles with edges:

1. Parallel to the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

Measure the corrected HMA pavement surface with a profilograph and a 12-foot straightedge and correct the pavement to within specified tolerances. If a must-grind area or straightedged pavement cannot be corrected to within specified tolerances, remove and replace the pavement.

On ground areas not overlaid with OGFC, apply fog seal coat under section 37-1.

39-1.01D(13) Density Cores

Take 4-inch or 6-inch density cores to determine percent of theoretical maximum density. Take a minimum of 2 density cores each paving day from random locations you select. Backfill and compact holes with authorized material.

39-1.01D(14) Data Cores

Data core summary and data core digital photographs are required to document the pavement structural section. Take data cores that include the completed HMA pavement, underlying base, and subbase material. Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane

On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction. After coring, backfill and compact core holes with authorized material.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

Prepare a summary for each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:
    7.1. For recovered material, 1/2 inch
    7.2. For unstabilized material, 1.0 inch
8. Location including:
    8.1. County
    8.2. Route
    8.3. Post mile
    8.4. Lane number
    8.5. Lane direction
    8.6. Station

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. The core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

After data core summary and photograph submittal, dispose of cores.

39-1.01D(15) Engineer's Acceptance

The Engineer samples materials for testing under California Test 125 and tests under the applicable test method except samples may only be taken from one of the following:

1. Plant, a truck, or automatic sampling device
2. Mat behind the paver

The Engineer's sampling and testing is independent of your QC sampling and testing, statistically-based, and random.

If you request, the Engineer splits samples and provides you with a part.

The Engineer prepares 3 briquettes for air voids content and VMA determination. The Engineer reports the average of 3 tests.

The Engineer accepts HMA based on:

1. Accepted JMF

2. Authorized QC plan
3. Visual inspection
4. Compliance quality characteristics of the following 4 tables:

HMA Aggregate Acceptance

Quality characteristic				Test method	HMA-SP (Type A)	HMA-SP RHMA-SP-G	HMA-SP OGFC
Aggregate gradation[a, b]				AASHTO T 27	JMF ± Tolerance[c]	JMF ± Tolerance[c]	JMF ± Tolerance[c]
Sieve	3/4"	1/2"	3/8"				
1/2"	X	--	--				
3/8"	--	X	--				
No. 4	--	--	X				
No. 8	X	X	X				
No. 200	X	X	X				
Sand equivalent (min.)[d]				AASHTO T 176	47	47	--
Percent of theoretical maximum density (%)				California Test 375	92–97	92–97	--
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				AASHTO T 335	 95 90 70	 -- 90 70	 90 90 90
Los Angeles Rattler (%, max.) Loss at 100 rev. Loss at 500 rev.				AASHTO T 96	 12 40	 12 40	 12 40
Fine aggregate angularity (%, min.)				AASHTO T 304 Method A	45	45	--
Flat and elongated particles (%, max. by weight @ 5:1)				ASTM D 4791	Report only	Report only	Report only

[a]The Engineer determines combined aggregate gradations containing RAP under Laboratory Procedure LP-9.
[b]"X" denotes the sieves the Engineer considers for the specified aggregate gradation.
[c]The tolerances must comply with the allowable tolerances in section 39-1.02E.
[d]The Engineer reports the average of 3 tests from a single split sample.

HMA Mix Acceptance

Quality characteristic	Test method	HMA-SP		
		Type A	RHMA-SP-G	OGFC
Asphalt binder content (%)	AASHTO T 308 Method A	JMF -0.3, +0.5	JMF - 0.4, +0.5	JMF - 0.4, +0.5
HMA moisture content (%, max.)	AASHTO T 329	1.0	1.0	1.0
Air voids content (%) [a, b]	AASHTO T 269	4 ± 1.5	Specification ± 1.5	--
Voids filled with asphalt (%) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[c]	 65.0-75.0 65.0-75.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min.) 1/4" grading 3/8" grading 1/2" grading 3/4" grading	SP-2 Asphalt Mixtures Volumetrics[c]	 16.5 14.5 13.5 12.5	 -- -- 18.0–23.0 18.0–23.0	
Dust proportion 1/4" and 3/8" gradings 1/2" and 3/4" gradings	SP-2 Asphalt Mixtures Volumetrics[c]	0.9–2.0 0.6–1.3	Report only	--
Percent of theoretical maximum density (%)[d, f, g]	California Test 375	92–97	92–97	--

[a]The Engineer reports the average of 3 tests from a single split sample.

[b]The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275 , and theoretical maximum specific gravity under AASHTO T 209, Method A.

[c]Determine bulk specific gravity using AASHTO T 275.

[d]The Engineer determines percent of theoretical maximum density if any of the following:

1. 1/2-inch, 3/8-inch, or 1/4-inch grading is used and the specified total paved thickness is at least 0.15 foot.
2. 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot.

[f]The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:

1. AASHTO T 275 to determine in-place density of each density core instead of using the nuclear gauge in Part 4, "Determining In-Place Density By The Nuclear Density Device."
2. AASHTO T 209 Method A to determine theoretical maximum density instead of calculating test maximum density in Part 5, "Determining Test Maximum Density."

[g]The Engineer determines theoretical maximum density (AASHTO T 209 Method A) at the frequency specified for Test Maximum Density under California Test 375, Part 5. D.

HMA Acceptance In Place

Quality characteristic	Test method	HMA-SP		
		Type A	RHMA-SP-G	OGFC
Hamburg wheel track (minimum number of passes at 0.5 inch average rut depth)	AASHTO T 324 (Modified)[a]			--
PG 58		10,000	15,000	
PG 64		15,000	20,000	
PG-70		20,000	25,000	
PG-76 or higher		25,000	--	
Hamburg wheel track (inflection point minimum number of passes)	AASHTO T 324 (Modified)[a]			--
PG 58		10,000	10,000	
PG 64		10,000	12,500	
PG-70		12,500	15,000	
PG-76 or higher		15,000	--	
Moisture susceptibility (minimum dry strength, psi)	AASHTO T 283	120	120	--
Moisture susceptibility (tensile strength ratio, %)[b]	AASHTO T 283	70	70	--

[a]Test as specified in section 39-1.01D(1).
[b]Freeze thaw required.

Miscellaneous Quality HMA Acceptance

Quality characteristic	Test method	HMA-SP		
		Type A	RHMA-SP-G	OGFC
Smoothness	California Test 526	12-foot straightedge, must-grind, and PI_0	12-foot straightedge, must-grind, and PI_0	12-foot straightedge and must-grind
Asphalt rubber binder viscosity @ 375 °F (centipoises)	LP-11	--	1,500–4,000	1,500–4,000
Asphalt modifier	ASTM D 445 ASTM D 92 ASTM D 2007	--	Section 39-1.02D(2)(b)	Section 39-1.02D(2)(b)
Crumb rubber modifier	LP-10 CT 208 ASTM D 297	--	Section 39-1.02D(2)(c)	Section 39-1.02D(2)(c)

No single test result may represent more than the smaller of 750 tons or 1 day's production.

For any single quality characteristic except smoothness, if 2 acceptance test results for 1 day's production do not comply with the specifications:

1. Stop production.
2. Take corrective action.
3. In the Engineer's presence, take samples and split each sample into 4 parts. Test 1 part for compliance with the specifications and submit 3 parts to the Engineer. The Engineer tests 1 part for compliance with the specifications and reserves and stores 2 parts.
4. Demonstrate compliance with the specifications before resuming production and placement on the State highway.

The Engineer tests the density core you take from each 250 tons of HMA-SP (Type A), and RHMA-SP-G production. The Engineer determines the percent of theoretical maximum density for each density core by determining the density core's density and dividing by the theoretical maximum density.

The Engineer determines the percent of theoretical maximum density from density cores taken from the final layer measured the full depth of the total paved HMA-SP (Type A), and RHMA-SP-G thickness if any of the following applies:

1. If 1/2-inch, 3/8-inch, or 1/4-inch 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. If 3/4-inch aggregate grading is used and the specified total paved thickness is at least 0.20 foot and any layer is less than 0.20 foot.

If the percent of theoretical maximum density does not comply with the specifications, the Engineer may accept the HMA-SP (Type A), and RHMA-SP-G and the Department deducts payment based on the factors shown in the following table:

Reduced Payment Factors for Percent of Theoretical Maximum Density

HMA-SP (Type A) and RHMA-SP-G Percent of Theoretical maximum density	Reduced Payment Factor	HMA-SP (Type A) and RHMA-G-SP Percent of Theoretical maximum density	Reduced Payment Factor
92.0	0.0000	97.0	0.0000
91.9	0.0125	97.1	0.0125
91.8	0.0250	97.2	0.0250
91.7	0.0375	97.3	0.0375
91.6	0.0500	97.4	0.0500
91.5	0.0625	97.5	0.0625
91.4	0.0750	97.6	0.0750
91.3	0.0875	97.7	0.0875
91.2	0.1000	97.8	0.1000
91.1	0.1125	97.9	0.1125
91.0	0.1250	98.0	0.1250
90.9	0.1375	98.1	0.1375
90.8	0.1500	98.2	0.1500
90.7	0.1625	98.3	0.1625
90.6	0.1750	98.4	0.1750
90.5	0.1875	98.5	0.1875
90.4	0.2000	98.6	0.2000
90.3	0.2125	98.7	0.2125
90.2	0.2250	98.8	0.2250
90.1	0.2375	98.9	0.2375
90.0	0.2500	99.0	0.2500
< 90.0	Remove and Replace	> 99.0	Remove and Replace

39-1.01D(16) Dispute Resolution

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer within 5 business days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit quality control test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party (ITP) performs referee testing. Before the ITP participates in a dispute resolution, the ITP must be qualified under AASHTO Materials Reference Laboratory program (AMRL), and the Department's Independent Assurance Program. The ITP must be independent of the project. By mutual agreement, the ITP is chosen from:

1. A Department laboratory
2. A Department laboratory in a district or region not in the district or region the project is located
3. The Transportation Laboratory
4. A laboratory not currently employed by you or your HMA producer

If split QC or acceptance samples are not available, the ITP uses any available material representing the disputed HMA for evaluation.

39-1.02 MATERIALS

39-1.02A General

Use RAP aggregate for HMA-SP (Type A) as part of the virgin aggregate in a quantity equal to 25.0 ± 1.0 percent of the aggregate blend.

Do not use RAP aggregate for RHMA-SP-G and OGFC

Treat aggregate for OGFC aggregate with the same antistrip treatment used for HMA .

For miscellaneous areas and dikes:

1. Choose the 3/8-inch or 1/2-inch HMA-SP (Type A) and aggregate gradations.
2. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate and 6.0 percent for 1/2-inch aggregate. If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.
3. Choose asphalt binder Grade PG 70-10 or use the same grade specified for HMA-SP.

39-1.02B Geosynthetic Pavement Interlayer

Geosynthetic pavement interlayer must comply with section 88 for paving fabric or paving mat.

39-1.02C Tack Coat

Tack coat must comply with the specifications for asphaltic emulsion or asphalt binder. Choose the type and grade.

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume under section 9-1.02 or you may use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

39-1.02D Asphalt Binder

39-1.02D(1) General

Asphalt binder in HMA must comply with section 92.

For HMA-SP (Type A), the grade of binder must be _____.

For RHMA-SP-G, the grade of asphalt binder must be _____.

For HMA-O, the grade of asphalt binder must be __.

For RHMA-O, the grade of asphalt binder must be __.

Asphalt binder for geosynthetic pavement interlayer must comply with section 92. Choose from Grades PG 64-10, PG 64-16, or PG 70-10.

LAS-treated asphalt binder must comply with the specifications for asphalt binder. Do not use LAS as a substitute for asphalt binder.

39-1.02D(2) Asphalt Rubber Binder

39-1.02D(2)(a) General

Use asphalt rubber binder in RHMA-SP-G, and RHMA-O. Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. CRM

The combined asphalt binder and asphalt modifier must be 80.0 ± 2.0 percent by weight of the asphalt rubber binder.

Determine the amount of asphalt rubber binder to be mixed with the aggregate for RHMA-SP-G as follows:

1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
2. Plot asphalt rubber binder content versus average air voids content for each set of three specimens and connect adjacent points with a best-fit curve.
3. Calculate voids in mineral aggregate (VMA) and voids filled with asphalt (VFA) for each specimen, average each set, and plot the average versus asphalt rubber binder content.
4. Calculate the dust proportion and plot versus asphalt rubber binder content.
5. From the curve plotted in Step 2, select the theoretical asphalt rubber binder content that has ___ percent air voids.
6. At the selected asphalt rubber binder content, evaluate corresponding voids in mineral aggregate, voids filled with asphalt, and dust proportion to verify compliance with requirements. If necessary, develop an alternate composite aggregate gradation to conform to the RHMA-SP-G requirements.
7. Record the asphalt rubber binder content in Step 5 as the Optimum Bitumen Content (OBC).
8. To establish a recommended range, use the OBC as the high value and 0.2 percent less as the low value. The recommended range must not extend below 7.5 percent by total weight of the mix. If the OBC is 7.5 percent, then there is no recommended range, and 7.5 percent is the recommended value.

Laboratory mixing and compaction must comply with AASHTO R 35, except the mixing temperature of the aggregate must be between 300 degrees F and 325 degrees F. The mixing temperature of the asphalt-rubber binder must be between 375 degrees F and 425 degrees F. The compaction temperature of the combined mixture must be between 290 degrees F and 320 degrees F.

39-1.02D(2)(b) Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon, and comply with:

Asphalt Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Viscosity, m^2/s (x 10^{-6}) at 100 °C	ASTM D 445	X ± 3[a]
Flash Point, CL.O.C., °C	ASTM D 92	207 minimum
Molecular Analysis		
Asphaltenes, percent by mass	ASTM D 2007	0.1 maximum
Aromatics, percent by mass	ASTM D 2007	55 minimum

[a]The symbol "X" is the proposed asphalt modifier viscosity. "X" must be between 19 and 36. A change in "X" requires a new asphalt rubber binder design.

Asphalt modifier must be from 2.0 percent to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder.

39-1.02D(2)(c) Crumb Rubber Modifier

CRM must consist of a ground or granulated combination of scrap tire CRM and high natural CRM. CRM must be 75.0 ± 2.0 percent scrap tire CRM and 25.0 ± 2.0 percent high natural CRM by total weight of CRM. Scrap tire CRM must be from any combination of automobile tires, truck tires, or tire buffings.

Sample and test scrap tire CRM and high natural CRM separately. CRM must comply with:

Crumb Rubber Modifier for Asphalt Rubber Binder

Quality characteristic	Test method	Requirement
Scrap tire CRM gradation (% passing No. 8 sieve)	LP-10	100
High natural CRM gradation (% passing No. 10 sieve)	LP-10	100
Wire in CRM (% max.)	LP-10	0.01
Fabric in CRM (% max.)	LP-10	0.05
CRM particle length (inch max.) [a]	--	3/16
CRM specific gravity [a]	California Test 208	1.1 – 1.2
Natural rubber content in high natural CRM (%) [a]	ASTM D 297	40.0 – 48.0

[a]Test at mix design and for Certificate of Compliance.

Only use CRM ground and granulated at ambient temperature. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Only use cryogenically produced CRM particles that can be ground or granulated and not pass through the grinder or granulator.

CRM must be dry, free-flowing particles that do not stick together. CRM must not cause foaming when combined with the asphalt binder and asphalt modifier. You may add calcium carbonate or talc up to 3 percent by weight of CRM.

39-1.02E Aggregate

Aggregate must be clean and free from deleterious substances.

Gradations are based on nominal maximum aggregate size (NMAS).

The aggregate for HMA-SP (Type A) must comply with the _____ grading.

The aggregate for RHMA-SP-G must comply with the _____ grading.

The aggregate for HMA-O must comply with the _____ grading.

The aggregate for RHMA-O must comply with the _____ grading.

Aggregate gradation must be within the TV limits for the specified sieve size shown in the following tables:

Aggregate Gradation
(Percentage Passing)
HMA-SP (Type A)

1-inch HMA-SP (Type A)

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	—
3/4"	88-93	TV ± 5
1/2"	72-85	TV ± 6
3/8”	55-70	TV ± 6
No. 4	35-52	TV ± 7
No. 8	22-40	TV ± 5
No. 30	8-24	TV ± 4
No. 200	3–7	TV ± 2

3/4-inch HMA-SP (Type A)

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	—
3/4"	90–98	TV ± 5
1/2"	70–90	TV ± 6
No. 4	42–58	TV ± 5
No. 8	29–43	TV ± 5
No. 30	10–23	TV ± 4
No. 200	2–7	TV ± 2

1/2-inch HMA-SP (Type A)

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/4"	100	--
1/2"	95–98	TV ± 5
3/8"	72–95	TV ± 5
No. 4	52–69	TV ± 5
No. 8	35–55	TV ± 5
No. 30	15–30	TV ± 4
No. 200	2–8	TV ± 2

3/8-inch HMA-SP (Type A)

Sieve Sizes	Target Value Limits	Allowable Tolerance
1/2"	100	--
3/8"	95–98	TV ± 5
No. 4	55–75	TV ± 5
No. 8	30–50	TV ± 5
No. 30	15–35	TV ± 5
No. 200	2–9	TV ± 2

1/4-inch HMA-SP (Type A)

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/8"	100	--
No. 4	95–98	TV ± 5
No. 8	70–80	TV ± 6
No. 30	34–45	TV ± 5
No. 200	2–12	TV ± 4

Rubberized Hot Mix Asphalt - Gap Graded (RHMA-SP-G)

3/4-inch RHMA-SP-G

Sieve Sizes	Target Value Limits	Allowable Tolerance
1"	100	--
3/4"	95–98	TV ± 5
1/2"	83–87	TV ± 6
3/8"	65–70	TV ± 5
No. 4	28–42	TV ± 6
No. 8	14–22	TV ± 5
No. 200	0–6	TV ± 2

1/2-inch RHMA-SP-G

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/4"	100	--
1/2"	90–98	TV ± 6
3/8"	83–87	TV ± 5
No. 4	28–42	TV ± 6
No. 8	14–22	TV ± 5
No. 200	0–6	TV ± 2

Open Graded Friction Course (OGFC)

1-inch OGFC

Sieve Sizes	Target Value Limits	Allowable Tolerance
1 1/2"	100	--
1"	99–100	TV ± 5
3/4"	85–96	TV ± 5
1/2"	55–71	TV ± 6
No. 4	10–25	TV ± 7
No. 8	6–16	TV ± 5
No. 200	1–6	TV ± 2

1/2-inch OGFC

Sieve Sizes	Target Value Limits	Allowable Tolerance
3/4"	100	--
1/2"	95–100	TV ± 6
3/8"	78–89	TV ± 6
No. 4	28–37	TV ± 7
No. 8	7–18	TV ± 5
No. 30	0–10	TV ± 4
No. 200	0–3	TV ± 2

3/8-inch OGFC

Sieve Sizes	Target Value Limits	Allowable Tolerance
1/2"	100	--
3/8"	90–100	TV ± 6
No. 4	29–36	TV ± 7
No. 8	7–18	TV ± 6
No. 30	0–10	TV ±5
No. 200	0–3	TV ± 2

Aggregate gradation must be before the addition of asphalt binder and must include supplemental fines. The Engineer tests for aggregate grading under AASHTO T 27, note 4, and AASHTO T 11 do not apply. Use a mechanical sieve shaker. Aggregate shaking time must not exceed 10 minutes for both course and fine aggregate portions.

Choose a sieve size TV within each target value limits shown in the tables titled "Aggregate Gradation."

Before the addition of asphalt binder and lime treatment, aggregate must comply with:

Aggregate Quality

Quality characteristic	Test method	HMA-SP		
		Type A	RHMA-G-SP	OGFC
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.) Two fractured face	AASHTO T 335	 95 90 70	 -- 90 70	 90 90 90
Los Angeles Rattler (% max.) Loss at 100 Rev. Loss at 500 Rev.	AASHTO T 96	 12 40	 12 40	 12 40
Sand equivalent (min.)[a, b]	AASHTO T 176	47	47	--
Fine aggregate angularity (% min.)	AASHTO T 304 Method A	45	45	--
Flat and elongated particles (% max. by weight @ 5:1)	ASTM D 4791	10	10	10

[a]Reported value must be the average of 3 tests from a single sample.
[b]Use of a Sand Reader Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply

39-1.02F Reclaimed Asphalt Pavement

For HMA-SP (Type A), substitute RAP aggregate for part of the virgin aggregate in a quantity equal to 25.0 ± 1.0 percent of the aggregate blend

Provide enough space for meeting all RAP handling requirements at your facility. Provide a clean, graded base, well drained area for stockpiles.

If RAP is from multiple sources blend the RAP thoroughly and completely before fractionating. Fractionate RAP into 2 sizes, a coarse fraction RAP retained on 1/4-inch screen, and a fine fraction RAP passing 1/4-inch screen.

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.

39-1.02G Liquid Antistrip

LAS total amine value must be 325 minimum when tested under ASTM D 2074.

Use only 1 LAS type or brand at a time. Do not mix LAS types or brands.

Store and mix LAS under the manufacturer's instruction.

39-1.02H Lime

Lime for treating aggregate must be high-calcium hydrated lime and comply with section 24-2.02B.

39-1.02I Water

Water for lime treated aggregate must comply with section 24-2.02C.

39-1.02J Hot Mix Asphalt Production

39-1.02J(1) General

Produce HMA in a batch mixing plant or a continuous mixing plant.

HMA plants must be Department-qualified. Before production, the HMA plant must have a current qualification under the Department's Materials Plant Quality Program.

Proportion aggregate by hot or cold feed control. During production, you may adjust hot or cold feed proportion controls for virgin aggregate and RAP.

HMA-TYPE A-SP must have 25 ± 3 percent RAP.

39-1.02J(2) Mixing

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

Asphalt binder must be from 275 to 375 degrees F when mixed with aggregate.

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

When mixed with asphalt binder, aggregate must not be more than 325 degrees F except aggregate for OGFC with unmodified asphalt binder must be not more than 275 degrees F. Aggregate temperature specifications do not apply to RAP.

HMA must not be more than 325 degrees F.

39-1.02J(3) Asphalt Rubber Binder

Deliver scrap tire CRM and high natural CRM in separate bags.

Either proportion and mix asphalt binder, asphalt modifier, and CRM simultaneously or premix the asphalt binder and asphalt modifier before adding CRM. If you premix asphalt binder and asphalt modifier, mix them for at least 20 minutes. When you add CRM, the asphalt binder and asphalt modifier must be from 375 to 440 degrees F.

Do not use asphalt rubber binder during the first 45 minutes of the reaction period. During this period, the asphalt rubber binder mixture must be between 375 degrees F and the lower of 425 or 25 degrees F below the asphalt binder's flash point indicated in the MSDS.

If any asphalt rubber binder is not used within 4 hours after the reaction period, discontinue heating. If the asphalt rubber binder drops below 375 degrees F, reheat before use. If you add more scrap tire CRM to the reheated asphalt rubber binder, the binder must undergo a 45-minute reaction period. The added scrap tire CRM must not exceed 10 percent of the total asphalt rubber binder weight. Reheated and reacted asphalt rubber binder must comply with the viscosity specifications for asphalt rubber binder in section 39-1.02D(2). Do not reheat asphalt rubber binder more than twice.

39-1.02J(4) Liquid Antistrip Treatment

Perform liquid antistrip treatment (LAS) when the HMA mix design determines LAS treatment of HMA is required. LAS must be from 0.5 to 1.0 percent by weight of asphalt binder.

If 3 consecutive sets of recorded production data show actual delivered LAS weight is more than ±1 percent of the authorized mix design LAS weight, stop production and take corrective action.

If a set of recorded production data shows actual delivered LAS weight is more than ±2 percent of the authorized mix design LAS weight, stop production. If the LAS weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the

quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the plant controller or a computer's memory at the plant.

The Engineer orders proportioning operations stopped for any of the following if you:

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

If you stop production, notify the Engineer of any corrective actions taken before resuming.

39-1.02J(5) Aggregate Lime Treatment

Perform aggregate lime treatment when the HMA mix design determines aggregate lime treatment is required. Notify the Engineer at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

For aggregate dry lime treatment, marinate aggregate if the plasticity index determined under California Test 204 is from 4 to 10.

For lime slurry aggregate treatment, treat aggregate separate from HMA production, stockpile and marinate the aggregate.

If marination is required:

1. Treat and marinate coarse and fine aggregates separately.
2. Treat the aggregate and stockpile for marination only once.
3. Treat the aggregate separate from HMA production.

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

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

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

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

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

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

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

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

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

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

39-1.02J(6) Proportioning Dry Lime

Proportion dry lime by weight with a continuous operation.

If you use a batch-type proportioning operation for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment operation from HMA batching operations including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If using a continuous mixing operation for HMA without lime marinated aggregates, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the quantity of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for the lime treatment operation in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with Materials Plant Quality Program manual.

At the time of mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water for mixing and coating aggregate to the aggregate before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from aggregate.

The HMA plant must be equipped with a bag-house dust system. Material collected in the dust system must be returned to the mix.

39-1.02J(7) Proportioning Lime Slurry

Proportion lime and water with a continuous or batch operation.

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

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

39-1.02J(8) Mixing Dry Lime and Aggregate

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate. Store dry lime in a uniform and free-flowing condition. Introduce dry lime to the pugmill in a continuous operation. The

introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment operation is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

39-1.02J(9) Mixing Lime Slurry and Aggregate

Proportion lime slurry and aggregate by weight in a continuous operation.

39-1.02J(10) Production

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

The Engineer determines the combined aggregate gradation during HMA production after you have treated the aggregate.

Treated aggregate must not have lime balls or clods.

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

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

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

If marination is required, marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

39-1.02K Spreading and Compacting Equipment

39-1.02K(1) General

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.

The screed must produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades and cross sections.
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction.

39-1.02K(2) Method Compaction Equipment

For method compaction, each paver spreading HMA must be followed by 3 rollers:

1. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. One oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

Compact RHMA-G-SP under the specifications for compacting HMA except do not use pneumatic-tired rollers.

Compact OGFC with steel-tired, 2-axle tandem rollers. If placing over 300 tons of OGFC per hour, use at least 3 rollers for each paver. If placing less than 300 tons of OGFC per hour, use at least 2 rollers for each paver. Each roller must weigh between 126 to 172 pounds per linear inch of drum width. Turn the vibrator off.

39-1.02K(3) Material Transfer Vehicle

A material transfer vehicle (MTV) must be used when placing HMA-O, or RHMA-O.

The MTV must:

1. Either receive HMA directly from trucks or use a windrow pickup head to load it from a windrow deposited on the roadway surface.
2. Transfer HMA directly into the paver's receiving hopper or feed system.
3. Remix the HMA, with augurs, before loading the paver.
4. Have sufficient capacity to prevent stopping the paver.

39-1.03 CONSTRUCTION

39-1.03A General

Do not pave HMA on a wet pavement or frozen surface.

For miscellaneous areas and dikes, prepare the area to receive HMA. Preparing the area includes excavating and backfilling as needed. Spread HMA in 1 layer and compact to the specified lines and grades.

39-1.03B Surface Preparation

39-1.03B(1) General

Prepare subgrade or apply tack coat to surfaces receiving HMA. If specified, place geosynthetic pavement interlayer over a coat of asphalt binder.

39-1.03B(2) Subgrade

Subgrade to receive HMA-SP (Type A) must comply with the compaction and elevation tolerance specifications in the sections for the material involved. Subgrade must be free of loose and extraneous

material. If HMA-SP (Type A) is paved on existing base or pavement, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.

39-1.03B(3) Tack Coat

Apply tack coat:

1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
   3.1. Curbs
   3.2. Gutters
   3.3. Construction joints

Before placing HMA, apply tack coat in 1 application at the minimum residual rate specified for the condition of the underlying surface:

Tack Coat Application Rates for HMA

HMA over:	Minimum Residual Rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion	Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion
New HMA (between layers)	0.02	0.03	0.02
Existing AC and PCC pavement	0.03	0.04	0.03
Planed pavement	0.05	0.06	0.04

Tack Coat Application Rates for OGFC

OGFC over:	Minimum Residual Rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphaltic Emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphaltic Emulsion	Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphaltic Emulsion
New HMA	0.03	0.04	0.03
Existing AC and PCC pavement	0.05	0.06	0.04
Planed pavement	0.06	0.07	0.05

If you dilute asphaltic emulsion, mix until homogeneous before application.

Apply to vertical surfaces with a residual tack coat rate that will thoroughly coat the vertical face without running off.

If you request and the Engineer authorizes, you may:

1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
   2.1. No dust, dirt, or extraneous material is present
   2.2. Surface is at least 140 degrees F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

Asphalt binder tack coat temperature must be from 285 to 350 degrees F when applied.

39-1.03B(4) Geosynthetic Pavement Interlayer

Place geosynthetic pavement interlayer in compliance with the manufacturer's recommendations.

Before placing the geosynthetic pavement interlayer and asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. Repairing cracks is change order work.
2. Clean the pavement of loose and extraneous material.

Immediately before placing the interlayer, apply 0.25 gallon ± 0.03 gallon of asphalt binder per square yard of interlayer or until the fabric is saturated. Apply asphalt binder the width of the geosynthetic pavement interlayer plus 3 inches on each side. At interlayer overlaps, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

The minimum HMA thickness over the interlayer must be 0.12 foot thick including conform tapers. Do not place the interlayer on a wet or frozen surface.

Overlap the interlayer borders between 2 inches and 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift.

39-1.03C Transporting, Spreading, and Compacting

39-1.03C(1) General

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, pick-up, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

HMA deposited in a windrow on the roadway surface must not extend more than 100 feet in front of the MTV.

You may pave 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 a 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, hand tools or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

Longitudinal joints in the top layer must match specified lane edges. Alternate longitudinal joint offsets in lower layers at least 0.5 foot from each side of the specified lane edges. You may request other longitudinal joint placement patterns.

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 widening
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes change, 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.

If a leveling course using HMA-SP (Type A) is specified, fill and level irregularities and ruts with HMA-SP (Type A) before spreading HMA over base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce a uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not a leveling course.

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material without damaging the surface remaining in place. If placing HMA against the edge of a longitudinal or transverse construction joint and the joint is damaged or not placed to a neat line, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material without damaging the surface remaining in place. Repair or remove and replace damaged pavement at your expense.

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-SP (Type A) with unmodified binder
2. Below 140 degrees F for HMA-SP (Type A) with modified binder
3. Below 200 degrees F for RHMA-SP-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-SP-G.

If a 3/4-inch aggregate grading is specified, you may use a 1/2-inch aggregate grading if the specified paved thickness is from 0.15 to 0.20 foot thick.

Spread and compact HMA as specified for method compaction in section 39-1.03C(2) for any of the following conditions:

1. Specified paved thickness is less than 0.15 foot.
2. Specified paved thickness is less than 0.20 foot and a 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 the Engineer determines conventional compaction and compaction measurement methods are impeded

Do not open new HMA pavement to traffic until its mid-depth temperature is below 160 degrees F.

If you request and the Engineer authorizes, you may cool HMA-SP (Type A) with water when rolling activities are complete. Apply water under section 17.

Spread sand at a rate between 1 pound and 2 pounds per square yard on new RHMA-SP-G, and RHMA-O pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

39-1.03C(2) Method Compaction

Pave HMA in maximum 0.25-foot thick compacted layers.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

Spread HMA-SP (Type A) only if atmospheric and surface temperatures are:

Minimum Atmospheric and Surface Temperatures

Compacted Layer Thickness, feet	Atmospheric,°F		Surface,°F	
	Unmodified Asphalt Binder	Modified Asphalt Binder[a]	Unmodified Asphalt Binder	Modified Asphalt Binder[a]
< 0.15	55	50	60	55
0.15 – 0.25	45	45	50	50

[a]Except asphalt rubber binder.

If the asphalt binder for HMA-SP (Type A) is:

1. Unmodified asphalt binder, complete:
   1.1. First coverage of breakdown compaction before the surface temperature drops below 250 degrees F
   1.2. Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
   1.3. Finish compaction before the surface temperature drops below 150 degrees F
2. Modified asphalt binder, complete:
   2.1. First coverage of breakdown compaction before the surface temperature drops below 240 degrees F
   2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F
   2.3. Finish compaction before the surface temperature drops below 140 degrees F

For RHMA-SP-G:

1. Only spread and compact if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.

2. Complete the first coverage of breakdown compaction before the surface temperature drops below 280 degrees F.
3. Complete breakdown and intermediate compaction before the surface temperature drops below 250 degrees F.
4. Complete finish compaction before the surface temperature drops below 200 degrees F.
5. If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For HMA-O with unmodified asphalt binder:

1. Only spread and compact if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.
2. Complete first coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 200 degrees F.
4. If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For HMA-O with modified asphalt binder except asphalt rubber binder:

1. Only spread and compact if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F.
2. Complete first coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 180 degrees F.
4. If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface.

For RHMA-O:

1. Only spread and compact if the atmospheric temperature is at least 55 degrees F and surface temperature is at least 60 degrees F.
2 Complete the 1st coverage using 2 rollers before the surface temperature drops below 280 degrees F.
3. Complete compaction before the surface temperature drops below 250 degrees F.
4. If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarpaulins. The tarpaulins must completely cover the exposed load until the mixture is transferred to the paver's hopper or to the pavement surface.

For RHMA-SP-G and OGFC, tarpaulins are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Start rolling at the lower edge and progress toward the highest part.

Perform breakdown compaction of each layer of HMA-SP (Type A) and RHMA-SP-G with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off. The Engineer may order fewer coverages if the HMA-SP (Type A) or RHMA-SP-G layer thickness is less than 0.15 foot.

Perform intermediate compaction of each layer of HMA-SP (Type A)or RHMA-SP-G with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.

Perform finish compaction of HMA-SP (Type A) and RHMA-SP-G with 1 coverage using a steel-tired roller.

Compact OGFC with 2 coverages using steel-tired rollers.

39-1.03D Rumble Strips

Construct rumble strips in the top layer of HMA surfacing by ground-in or rolled-in methods.

Choose between ground-in or rolled-in rumble strips.

Select the method and equipment for constructing ground-in indentations.

Do not construct rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. The grinding equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Indentations must comply with the specified dimensions within 0.06 inch in depth and 10 percent in length and width.

The Engineer orders grinding or removal and replacement of noncompliant rumble strips to bring them within specified tolerances. Ground surface areas must be neat and uniform in appearance.

The grinding equipment must be equipped with a vacuum attachment to remove residue from the roadbed.

Dispose of removed material.

On ground areas, apply fog seal coat under section 37-2.

39-1.03E Vertical Joints

If you perform half-width paving, at the end of each day's work the distance between the ends of adjacent surfaced lanes must not be greater than can be completed in the following day of normal paving.

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

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

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 between 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 approved bond breaker under the conform tapers to facilitate the taper removal when paving operations resume.

39-1.03F Widening

If widening existing pavement, construct new structural section on both sides of the existing pavement to match the elevation of the existing pavement's edge for the project's entire length before placing HMA over the existing pavement.

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

If widening existing pavement, construct new structural section on both sides of the existing pavement to match the elevation of the existing pavement's edge in increments of at least _____ feet before placing HMA over the existing pavement.

39-1.03G Conform Tapers

Place shoulder conform tapers concurrently with the adjacent lane's paving.

Place additional HMA-SP (Type A) along the pavement's edge to conform to road connections and private drives. Hand rake, if necessary, and compact the additional HMA to form a smooth conform taper.

39-1.04 PAYMENT

The weight of each HMA mixture shown in the Bid Item List is the combined mixture weight.

If tack coat, asphalt binder, and asphaltic emulsion are paid as separate bid items, their bid items are measured under section 92 or section 94.

If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
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 is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

Place hot mix asphalt dike of the type specified is measured along the completed length.

Place hot mix asphalt (miscellaneous areas) is measured as the in-place compacted area.

HMA-SP (Type A) for dike and miscellaneous areas are measured by weight.

Geosynthetic pavement interlayer is measured by the square yard for the actual pavement area covered.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity. Section 9-1.06 does not apply.

If the dispute resolution independent third party determines the Department's test results are correct, the Engineer deducts the independent third party's testing costs from payments. If the independent third party determines your test results are correct, the Department pays the independent third party's testing costs.

Rumble strips are measured by the station along the length of the rumble strips without deductions for gaps between indentations.

3. PIEZO-ELECTRIC AXLE SENSOR

10-3.__ PIEZO-ELECTRIC AXLE SENSOR

The piezo-electric axle sensors shall be Class I to be used for Weigh in Motion. These sensors shall be compatible with existing counters and classifiers.
Piezo-electric axle sensors shall consist of a piezo-electric copolymer surrounded by thin brass sheath. The finished dimension of the sensor shall be 1/4 inch wide x 1/16 inch thick. Sensors shall be 10 feet in length and shall come attached with unspliced screened transmission cable (STC).
The connection between the sensor and the STC shall be hermetically sealed.
The sensors are to be installed in an array of two inductive loop detectors and two Piezo-electric sensors per lane. The Engineer shall determine the exact location of the inductive loop detectors and peizoelectric sensors.

SCREENED TRANSMISSION CABLE

Screened transmission cable (STC) shall be RG-58C/U coaxial cable. Cable shall be rated for under ground direct burial. The STC shall have High Density Poly Ethylene Jacket that resists nicks and cuts.
The cable length shall be long enough to reach the controller cabinet without any splice. STC terminations shall be made using properly sized captive or spring spade type terminals, crimped and soldered.

EPOXY GROUT AND SEALANT

The sawed pavement slots containing piezo-electric sensors and STC shall be filled with epoxy grout conforming to Global Resins PU200 or International Road Dynamics AS 475 or equivalent. The epoxy grout shall not exceed 76 °C while curing and shall be adequately set before re-opening the lane to traffic.
The saw cut slots containing inductive loop detectors shall be filled with elastomeric sealant conforming to Section 86-5.01A(5), "Installation Details," of Standard Specifications.

ACCEPTANCE TESTING

The Contractor must demonstrate that the automatic vehicle classification system is available for use by the Department of Transportation by successfully completing the acceptance test for each lane of data collection.
The acceptance test shall consist of the following:

1. Loop detectors shall be tested according to the procedure in Section 86-2.14B, "Field Testing," of the Standard Specifications.
2. Piezo-electric axle sensors shall be tested as follows:

2.1. Capacitance shall be 20 percent of the sensor's data sheet as provided by the manufacturer
2.2. Dissipation factor shall be less than 0.04 nF when measured in the 20 nF range
2.3. Resistance shall be greater than 20 Megohms

3. A minimum of 100 per-vehicle records shall be collected for each lane. Collected data must meet the following accuracy standards:

3.1. Total Volume: ±3 percent with 95 percent accuracy
3.2. Vehicle Classification: 95 percent accurate classification by type.

4. Correct functioning of the communications link shall be verified by collecting data files from the on-site equipment with the central office host computer.

5. Continuous operation of the automatic vehicle classification system on-site equipment be checked for 5 consecutive days. Failure of the system to record and store data meeting the requirements set forth in these special provisions for an accumulated time exceeding 3 hours during the 5-day period shall be cause for the acceptance test to be rejected and repeated.

6. Failure of the software to perform any application required in these special provisions shall be cause for the acceptance test to be rejected and repeated.

PERFORMANCE CHARACTERISTICS

The piezo-electric axle sensors shall meet the following perforance characteristics:

Output Uniformity	±20 percent
Operating Temperature Range	From -40 to +70 °C
Typical Output Level	A wheel load of 400 pounds will produce a minimum output signal of ≥150 mV, at 21 °C and 55 mph.
Signal-to-Noise Level	The signal-to-noise level shall be equal to or greater than 10:1.
Insulation Resistance	>500 Mohms
Product Life	Minimum 25 Million Equivalent Single Axle Loadings (ESAL)

4. REMOVE YELLOW TRAFFIC STRIPE AND PAVEMENT MARKING WITH HAZARDOUS WASTE RESIDUE

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 __ 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 __ 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

Not used

5. REMOVE TRAFFIC STRIPES AND PAVEMENT MARKINGS CONTAINING LEAD

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).

6. CONCRETE BASES

Replace Section 28 with the following:

28 CONCRETE BASES

28-1 GENERAL

Not Used

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

Submit quality control test results within 24 hours of test completion.

28-2.01C(2) Field Qualification

With each field qualification, manufacture 12 specimens under ASTM C 31 and submit six specimens. Use one batch for all 12 specimens.

Submit field qualification data and test reports including:

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

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

28-2.01D 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. Field qualify the LCB demonstrating ability to comply with the specifications
4. Obtain authorization

Molds for compressive strength testing under ASTM C 31 or ASTM C 192 must be 6 by 12 inches.

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 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

Proposed proportions must be field qualified before you place the LCB represented by those proportions. Use an American Concrete Institute (ACI) certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

Provide notice 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 in compliance with the Quality Control Requirements table.

Field qualification testing for compressive strength must comply with the following:

1. Manufacture 12 cylinders under ASTM C 31 from a single batch
2. Test 6 cylinders under ASTM C 39 at 7 days of age
3. Perform 3 tests; each test consists of 2 cylinders
4. At 7 days age, the average compressive strength for each test must be at least 450 psi and the average compressive strength for the 3 tests must be at least 500 psi
5. At 7 days age, the average compressive strength for each test must not exceed 850 psi and the average compressive strength for the 3 tests must not exceed 800 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. Perform testing and sampling for the quality characteristics shown in the following table:

Quality Control Requirements

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement
Sand equivalent	California Test 217	1 per 500 cubic yards but at least 1 per day of production	18
Aggregate gradation	California Test 202		Note a
Air content (percent, max) [b]	California Test 504		4
Penetration (inches)	California Test 533		0-1 1/2 nominal [c]
Compressive strength (psi at 3 days)	ASTM C 39 [d]	1 per 1,000 cu yd but at least 1 per day of production	200 – 500 [e]

[a] Comply with the Aggregate Grading table in section 28-2.02.
[b] If no single test in the first 5 air content tests exceeds 1 1/2 percent, no further air content tests are required.
[c] Maximum penetration must not exceed 2 inches.
[d] Cylinders made under ASTM C 31
[e] Construct transverse contraction joints if greater than 500 psi. See section 28-2.03D.

28-2.01D(5) Acceptance Criteria

LCB acceptance is based on compliance with LCB Acceptance Criteria Testing table:

Acceptance Criteria Testing

Property	Test method	Value
Compressive strength (psi at 3 days)	ASTM C 39 [a]	200 – 500 [b, c]

[a] Cylinders made under ASTM C 31
[b] 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.
[c] Construct transverse contraction joints if greater than 500 psi. See section 28-2.03D.

28-2.02 MATERIALS

Cementitious material for field qualification and production must comply with section 90-1.02B. For aggregate qualification testing, use Type II portland cement under section 90-1.02B(2).

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.

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 California Test 202, the percentage composition by weight of the aggregate must comply with the grading requirements for the sieve sizes shown in the following table:

Aggregate Grading[a]

Sieve sizes	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

[a]Modify California Test 202 under California Test 105 whenever the difference in the specific gravities of the coarse and fine portions of the aggregate or the blends of different aggregates is 0.2 or more.

Aggregate must comply with the quality requirements shown in the following table:

Aggregate Quality

Property	Test Method	Operating range	Contract compliance
Sand equivalent (min)	CT 217	21	18
Compressive strength (min, psi at 7 days)	ASTM D 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 to the Engineer 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 (1) for at least 72 hours after 1st application of the curing compound and (2) completion of contraction joints including transverse joints due to compressive strength exceeding 500 psi at 3 days. Limit traffic and equipment on the LCB to that used in paving operations or placing additional layers of LCB.

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. LCB used to fill low areas of subgrade is not included in the quantity of LCB for payment.

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.

Nominal penetration range for LCB must be from 0 to 1-1/2 inches under California Test 533. Maximum penetration must not exceed 2 inches.

28-2.03D Placing

Place LCB under section 40-1.03H(1) except the 3rd paragraph does not apply.

Unless shown or specified, 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 every 16 feet within the represented area if the compressive strength at 3 days exceeds 500 psi in (1) one thousand cu yd or (2) one day's production, whichever is less.

For LCB to be paved with concrete pavement, construct longitudinal construction and contraction joints in LCB to provide at least 1 foot horizontal clearance from planned longitudinal construction and 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 Spreading, Compacting, and Shaping

Spread, compact, and shape LCB under section 40-1.03H(4) or under section 40-1.03H(5).

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.

Do not texture LCB to be paved with concrete pavement. Before applying curing compound, finish LCB to a smooth surface free from mortar ridges and other projections.

The finished surface must be free from porous areas.

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.

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.

28-2.03F Curing

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 use curing compound no. 3 that contains a minimum of 22 percent nonvolatile vehicles consisting of at least 50 percent paraffin wax. 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
3. At a rate of 1 gal/150 sq ft for the first application
4. At a rate of 1 gal/200 sq ft for the second application. Within 4 days after the first application, clean the surface and apply the second application.

Immediately repair damage to the curing compound or LCB.

28-2.03G Surfaces Not Within Tolerance

Where LCB will be paved with concrete pavement, remove the base wherever the surface is higher than the grade established by the Engineer and replace it with LCB. Where LCB will not be paved with concrete pavement, remove the base wherever the surface is higher than 0.05 foot above the grade established by the Engineer and replace it with LCB. If authorized, grind the surface with either a diamond or carborundum blade to within tolerance. After grinding LCB to be paved with concrete pavement and after all free water has left the surface, clean foreign material and grinding residue from the surface. Apply curing compound to the ground area at a rate of approximately 1 gal/150 sq ft.

Where the surface of LCB is lower than 0.05 foot from the grade established by the Engineer, remove the base and replace it with LCB or, if authorized, fill low areas according to the pavement material as follows:

1. For HMA pavement, fill low areas with HMA that complies with the specifications for the lowest layer of pavement. Do not fill low areas concurrently with the paving operation.
2. For concrete pavement, fill low areas with pavement concrete concurrent with the paving operation.

28-2.04 PAYMENT

Not used

28-3 RAPID STRENGTH CONCRETE BASE

28-3.01 GENERAL

28-3.01A Summary

Section 28-3 includes specifications for constructing rapid strength concrete base (RSCB).

28-3.01B Definitions

final set time: Elapsed time after initial contact of cement and water required for the mortar sieved from the concrete to reach a penetration resistance of 4,000 psi determined under ASTM C 403.

early age: Any age less than 10 times the RSCB final set time.

opening age: Age at which the RSCB achieves the specified strength for opening to traffic, including construction traffic.

28-3.03C Submittals

At least 10 days before placing RSCB, submit a mix design that includes:

1. Opening age
2. Proposed aggregate gradation
3. Proportions of hydraulic cement and aggregate
4. Types and amounts of chemical admixtures
5. Maximum time allowed between batching and placing
6. Final set time
7. Any special instructions or conditions such as water temperature requirements

Submit aggregate samples split from samples taken during test strip construction.

At least 45 days before placing RSCB, submit a sample of cement from each proposed lot and samples of proposed admixtures in the quantities ordered.

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

At least 20 days before placing RSCB, submit a QC plan.

28-3.01D Quality Control and Assurance

28-3.01D(1) General

Schedule a preoperation conference at a mutually agreed time and place to meet with the Engineer. Make arrangements for the conference facility. Discuss the project specifications and methods of performing each item of work. Items discussed must include the processes for:

1. Production
2. Transportation
3. Placement
4. QC plan, if required
5. Contingency plan
6. QC sampling and testing
7. Acceptance criteria

If QC or acceptance testing indicate non-compliance, stop RSCB placement and before resuming activities:

1. Inform the Engineer of the adjustments you will make
2. Reprocess, remedy, or replace the noncompliant RSCB until it complies with specifications
3. Construct a new test strip of RSCB with proposed adjustments demonstrating ability to comply with the specifications
4. Obtain authorization

Beams for modulus of rupture testing must be fabricated and tested under California Test 524. The beams may be fabricated using an internal vibrator under ASTM C 31. For each test, 3 beam specimens must be fabricated and the test results averaged. No single test represents more than that day's production or 130 cu yd, whichever is less.

For early age testing, beams must be cured so the monitored temperatures in the beams and the test strip are always within 5 degrees F. The internal temperatures of the RSCB and early age beams must be monitored and recorded at intervals of at least 5 minutes. Thermocouples or thermistors connected to strip-chart recorders or digital data loggers must be installed to monitor the temperatures. Temperature recording devices must be accurate to within ±2 degrees F. Until early age testing is completed, internal temperatures must be measured at 1 inch from the top, 1 inch from the bottom, and no closer than 3 inches from any edge.

For other age testing, beams must be cured under California Test 524 except beams must be placed into sand at a time that is from 5 to 10 times the final set time, or 24 hours, whichever is earlier.

Preoperation conference attendees must sign an attendance sheet provided by the Engineer. The preoperation conference must be attended by your:

1. Project superintendent
2. Project manager
3. QC manager
4. RSCB placement foreman
5. RSCB plant manager
6. RSCB plant operator
7. Plant inspector

8. RSCB placement machine operators
9. Inspectors
10. Samplers
11. Testers
12. Subcontractor's workers

Do not start RSCB placement activities until the listed personnel have attended the preoperation conference.

28-3.01D(2) Quality Control Managers

Designate a lead QC manager to administer the QC plan and assistant QC managers. The lead QC manager must hold current American Concrete Institute (ACI) certification as a "Concrete Field Testing Technician-Grade I" and a "Concrete Laboratory Testing Technician-Grade II." Assistant QC managers must hold current ACI certification as a "Concrete Field Testing Technician-Grade I" and either a "Concrete Laboratory Testing Technician-Grade I" or a "Concrete Laboratory Testing Technician-Grade II." The Department qualifies the QC samplers and testers through the Independent Assurance Program (IAP) for the sampling and testing they perform.

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

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

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

28-3.01D(3) Quality Control Plan

The QC plan must comply with section 40-1.01D(4) except do not include bar reinforcement, dowel bars, tie bars, joint seals, and corrective action to be taken if penetration or air content measurements are outside action or suspension limits.

28-3.01D(4) Test Strip

Before starting work on RSCB, complete a test strip. The test strip must demonstrate that you are capable of producing RSCB in compliance with the specifications within the specified time periods including delivery, placement, finishing, and curing times, and under similar atmospheric and temperature conditions expected during placement operations.

Construct test strips using the authorized mix design. Do not construct a test strip until the QC plan is authorized and until designated personnel have attended a pre-operation conference.

Test strip must be at least 100 feet long and the width and depth dimensions shown.

Place the test strip at an agreed upon location near the job site. You may use the test strip in the work if it is placed where it will not be covered during the evaluation period. Do not use test strips in the work unless authorized.

Within 20 minutes after RSCB delivery for the test strip, fabricate test beams. Use the beams to determine modulus of rupture values.

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

After test strip evaluation, dispose of test strip test beams. If the test strip is not used in the work, remove the test strip.

28-3.01D(5) 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 RSCB production and placement. Notify the Engineer at least 2 business days before any sampling and testing. Submit testing results within 15 minutes of testing completion. Record inspection, sampling, and testing on the forms accepted with the QC plan and submit them within 48 hours of completion of each day of production and within 24 hours of 7-day modulus of rupture tests. Perform testing and sampling for the quality characteristics shown in the following table:

28-4 LEAN CONCRETE BASE RAPID SETTING

28-4.01 GENERAL

28-4.01A Summary

Section 28-4 includes specifications for constructing lean concrete base rapid setting (LCBRS).

28-4.01B Definitions

final set time: Elapsed time after initial contact of cement and water required for the mortar sieved from the concrete to reach a penetration resistance of 4,000 psi determined under ASTM C 403.

opening age: Age at which the LCBRS achieves the specified strength for opening to traffic, including construction traffic.

28-4.01C Submittals

28-4.01C(1) General

At least 25 days before field qualification, submit the name of your proposed testing laboratory.

Submit quality control test results within 24 hours of test completion.

Molds for compressive strength testing under ASTM C 31 and ASTM C 192 must be 6 by 12 inches.

28-4.01C(2) Mix Design

Determine the mix proportions for LCBRS and submit mix designs.

At least 10 days before placing LCBRS, submit a mix design for LCBRS that includes:

1. Opening age
2. Proposed aggregate gradation
3. Mix design, including
    - 3.1. Proportions
    - 3.2. Types and amounts of chemical admixtures
4. Maximum time allowed between batching and placing
5. Range of ambient temperatures over which the mix design is applicable
6. Final set time
7. Aggregate qualification test results, if required

Submit 1 mix design for each ambient temperature variation anticipated during LCBRS placement. Each mix design must have a maximum ambient temperature range of 18 degrees F.

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

28-4.01C(3) Field Qualification

Submit field qualification data and test reports including:

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

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

28-4.01D Quality Control and Assurance

28-4.01D(1) General

Stop LCBRS 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 LCBRS

If LCBRS activities are stopped, before resuming activities:

1. Inform the Engineer of the adjustments you will make
2. Remedy or replace the noncompliant LCBRS until it complies with specifications
3. Field qualify the LCBRS demonstrating ability to comply with the specifications
4. Obtain authorization

28-4.01D(2) Compressive Strength Specimens

Prepare compressive strength test specimens under California Test 540 except a vibrator under California Test 524 may be used instead of rodding. Test compressive strength specimens under California Test 521. Perform at least 1 test at opening age for each 4 hours of LCBRS placement work and within the last hour of placement work. Each test is two cylinders.

28-4.01D(3) Field Qualification

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

Field qualification must comply with the following:

1. Make 6 cylinders for each age under California Test 540 except a vibrator under California Test 524 may be used instead of rodding
2. Test cylinders under California Test 521 at opening age and 7 days of age
3. Perform 3 tests; each test consists of 2 cylinders
4. At opening age, the average strength for each test must be at least 180 psi and the average strength for the 3 tests must be at least 200 psi
5. At 7 days age, the average strength for each test must be at least 600 psi and the average strength for the 3 tests must be at least 725 psi

28-4.01D(4) Acceptance Criteria

LCBRS acceptance is based on compliance with LCBRS Acceptance Criteria Testing table:

LCBRS Acceptance Criteria Testing

Quality characteristic	Test method	Requirement
Compressive strength (psi at 7 days)	CT 521[a]	725

Note:
Cylinders made under California Test 540 except a vibrator under California Test 524 may be used instead of rodding

28-4.02 MATERIALS

28-4.02A General

Not Used

28-4.02B Cement

Cement must comply with cement for RSC.

28-4.02C Chemical Admixtures

Chemical admixtures must comply with chemical admixtures for concrete except you may use Type E chemical admixture. You may use citric acid or borax if you submit a written request from the cement manufacturer and a test sample.

28-4.02D Aggregates

Aggregate must comply with either of the following:

1. Section 90-1.02C except aggregate grading must comply with the aggregate grading table in section 28-2.02
2. Section 28-2.02 and the following:
    - 2.1. Qualify the aggregate for each proposed aggregate source and gradation
    - 2.2. 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 compressive strength must be at least 610 psi. Cement must be Type II portland cement under section 90-1.02B(2).

28-4.03 CONSTRUCTION

28-4.03A General

Construct LCBRS under section 28-2.03 except (1) section 28-2.03A does not apply and (2) the 4th paragraph of section 38-2.03D does not apply.

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

28-4.03B Proportioning, Mixing, and Transporting

For batches with a volume of 1 cu yd or more, comply with one of the following methods:

1. Batch the ingredients at a central batch plant and charge them into a mixer truck for transportation to the pour site.
2. Batch the ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a cement silo and weigh system, which must proportion cement for charging into the mixer truck.
3. Batch ingredients except the cement at a central batch plant and charge them into a mixer truck for transportation to a location where preweighed containerized cement is added to the mixer truck. The

cement preweighing operation must utilize a platform scale. The platform scale must have a maximum capacity of 2.75 tons with a maximum graduation size of 1 lb. Preweigh cement into a fabric container. The minimum amount of cement to be proportioned into any single container must be 1/2 of the total amount required for the load of LCBRS being produced.

4. Proportion cement, water, and aggregate volumetrically under ASTM C 685 or section 90-3.02B.

28-4.03C Placing

You may use metal or wood side forms. Wood side forms must not be less than 1-1/2 inches thick.

After you deposit the LCBRS on the subgrade, consolidate it with high-frequency internal vibrators. Consolidate adjacent to forms and across the full pavement width. Place LCBRS as nearly as possible to its final position.

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

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

28-4.04 PAYMENT

Lean concrete base rapid setting is measured from the dimensions shown.

If volumetric proportioning is performed and calibration is performed more than 100 miles from the project limits, the Department deducts $1,000 for each calibration session.

28-5 CONCRETE BASE

28-5.01 GENERAL

28-5.01A Summary

Section 28-5 includes specifications for constructing concrete base.

28-5.01B Quality Control and Assurance

28-5.01B(1) General

For each lot of concrete for concrete base:

1. Quantity must not exceed 1,000 cu yd
2. The Department determines the modulus of rupture of test beams aged 28 days under California Test 523
3. The Department calculates the modulus of rupture by averaging the individual test results of 2 beams aged for 28 days

28-5.01B(2) Acceptance Criteria

Concrete base acceptance is based on modulus of rupture

Acceptance for modulus of rupture is on a lot basis. The modulus of rupture determined under California Test 523 for each lot must be at least 570 psi at 28 days.

The Department provides molds and machines for modulus of rupture acceptance testing. Provide material and labor the Engineer may require.

28-5.02 MATERIALS

28-5.02A General

Not Used

28-5.02B Portland Cement Concrete

Concrete must be PCC.

For the combined aggregate grading, the difference between the percent passing the 3/8-inch sieve and the percent passing the no. 8 sieve must be at least 16 percent of the total aggregate.

The specifications for reduction in operating range and contract compliance for cleanness value and sand equivalent for coarse aggregate in section 90-1.02C(2), and fine aggregate in section 90-1.02C(3) do not apply to concrete base.

Concrete base must contain not less than 550 pounds of cementitious material per cubic yard.

28-5.02C Curing Seal

Asphaltic emulsion must be Grade RS1 or SS1.

28-5.03 CONSTRUCTION

28-5.03A General

Aggregate and bulk cementitious material must be proportioned by weight by means of automatic proportioning devices of authorized types.

28-5.03B Subgrade Preparation

Immediately before placing concrete base, the subgrade to receive the base must comply with the specified compaction and elevation tolerances and the following:

1. Free of loose and extraneous material
2. Uniformly moist, but free of standing or flowing water

28-5.03C Placing, Spreading, and Shaping

You may place concrete base in 2-lane monolithic segments. A longitudinal joint is not required in the center of this concrete base.

Place concrete base under section 40-1.03H except the 3rd paragraph of 40-1.03H(1) does not apply.

The concrete base finished surface must not vary more than 1/4 inch from the bottom of a 12-foot long straightedge placed parallel with the center line.

Broom the concrete base surface to produce a uniform, rough surface. Do not broom the surface until the concrete base has set sufficiently.

Begin curing seal work as soon as free water leaves the concrete base surface and the surface is finished, but not later than 3 hours after placing.

Cure concrete base by applying asphaltic emulsion under section 94. Apply curing seal at a rate from 0.15 to 0.25 gal per sq yd. The Engineer determines the exact application rate. If you damage applied curing seal, immediately cover the damaged area with additional curing seal. Leave the curing seal on the concrete base for when surfacing is placed.

Construct transverse contraction joints at 30-foot intervals. Cut a groove in the concrete base with a power driven concrete saw. Grooves for longitudinal and transverse contraction joints must be the minimum width possible for the type of saw used. Immediately wash slurry from the joint with water. Water pressure must be less than 100 psi. Apply curing seal on cleaned contraction joints.

Saw transverse contraction joints before volunteer cracking occurs and after the concrete base is hard enough to saw without spalling, raveling, or tearing.

Concrete base must be within 0.05 foot of the grade established be the Engineer. Remove and replace hardened concrete base with a surface higher than 0.05-foot above the grade established by the Engineer with concrete base, or if approved, high areas may be ground until the surface of concrete base conforms to the tolerances specified. Grinding equipment must be equipped with diamond carborundum blades. Clean the ground area of concrete base that is to be covered with pavement of all foreign material and grinding residue as soon as any free water has left the surface and apply curing seal.

Where the surface of concrete base is lower than 0.05 foot from the grade established by the Engineer, remove and replace it with concrete base or, if authorized, fill low areas with HMA that complies with the specifications for the lowest layer of pavement. Do not fill low areas concurrently with the paving operation.

If you do not place HMA within 24 hours of applying curing seal, apply more asphaltic emulsion at a residual binder rate from 0.03 to 0.05 gal/sq yd immediately before placing HMA.

28-5.04 PAYMENT

Concrete base is measured from the dimensions shown.

Curing seal is measured under section 94. The amount of curing seal used is determined from the gauge on the curing equipment.

28-6 ROLLER COMPACTED CONCRETE BASE

28-6.01 GENERAL

28-6.01A Summary

Section 28-6<Roller Compacted Concrete Base> includes specifications for placing and curing RCC base.

28-6.01B Definitions

Not Used

28-6.01C Submittals

28-6.01C(1) General

Not Used

28-6.01C(2) Mix Design

At least 30 days before starting field qualification, submit the proposed RCC base mix proportions, the corresponding mix identifications, and laboratory test reports including the compressive strength for each trial mixture at 10, 21, 28, and 42 days. If the mix proportions qualify the mix to allow 56 days to attain the strength under 90-1.01D(5)a, also submit the strength test results for 56 days.

28-6.01C(3) Quality Control Plan

Submit a RCC base QC plan. Allow 30 days for the Department's review. You or the Engineer may request a QC plan meeting.

The QC plan must comply with section 40-1.01D(4) except do not include bar reinforcement, dowel bars, tie bars, joint seals, and corrective action to be taken if penetration or air content measurements are outside action or suspension limits.

28-6.01C(4) Field Qualification

Submit field qualification data and test reports including:

1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cubic yards
4. Type and source of ingredients used
5. Air content of the plastic RCC base
6. Age and strength at time of testing

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

28-6.01D Quality Control and Assurance

28-6.01D(1) General

Testing must be performed by an authorized laboratory. Testing personnel for QC must be qualified under the Department's Independent Assurance Program.

28-6.01D(2) Mix Design

Make trial mixtures for mix designs no more than 24 months before field qualification.

Class A RCC base must contain at least 340 pounds of cementitious material per cubic yard.

Class B RCC base must contain at least 255 pounds of cementitious material per cubic yard.

Your laboratory must determine the cementitious materials content to ensure compliance with the specifications.

For Class A RCC base, the compressive strength of cylinders made under ASTM C 1435 and tested under California Test 521 used to determine the mixture proportions must be at least 2,800 psi at 28 days age and at least 3,600 psi at 42 days age. If the mix proportions qualify the mix to allow 56 days to attain the compressive strength under 90-1.01D(5)a, the compressive strength must be at least 2,400 psi at 28 days and 3,600 psi at 56 days.

For Class B RCC base, the compressive strength of cylinders made under ASTM C 1435 and tested under California Test 521 used to determine the mixture proportions must be at least 1,500 psi at 28 days age and at least 2,100 psi at 42 days age. If the mix proportions qualify the mix to allow 56 days to attain the compressive strength under 90-1.01D(5)a, the compressive strength must be at least 1,250 psi at 28 days and 2,100 psi at 56 days.

If changing an aggregate supply source or the mix proportions, produce a trial batch and field-qualify the new RCC base. The Engineer does not adjust contract time for performing sampling, testing, and qualifying new mix proportions or changing an aggregate supply source.

28-6.01D(3) Field Qualification

Proposed proportions must be field qualified before you place the RCC base represented by those proportions. Use an American Concrete Institute (ACI) certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

Provide notice at least 5 days before field qualification. Perform field qualification within the job site or a location authorized by the Engineer.

Field qualification is accepted if five test cylinders made under ASTM C 1435 and tested under CT 521 comply with the following:

1. At a minimum, cylinders are tested at 10, 21, and 28 days of age
2. For Class A RCC base either:
    - 2.1 At an age not later than 28 days, no single specimen is less than 2,400 psi or
    - 2.2 At an age not later than the maximum allowed, no single specimen is less than 3,600 psi.
3. For Class B RCC base either:
    - 3.1 At an age not later than 28 days, no single specimen is less than 1,250 psi or
    - 3.2 At an age not later than the maximum allowed, no single specimen is less than 2,100 psi.

28-6.01D(4) Quality Control Testing

Perform sampling under California Test 125.

Perform quality control sampling, testing, and inspection throughout RCC base production and placement. Notify the Engineer at least 2 business days before any sampling and testing. Submit testing

results within 15 minutes of testing completion. Record inspection, sampling, and testing on the forms accepted with the QC plan and submit them within 48 hours of completion of each day of production. Perform testing and sampling for the quality characteristics shown in the following table:

Quality Control Testing

Test	Frequency	Test method	Requirement
Cleanness value	2 per day	CT 227	Section 90-1
Sand equivalent	2 per day	CT 217	
Aggregate gradation	2 per day	CT 202	
Air content	1 per 4 hours	CT 504	
Calibration of moisture meter [a]	1 per day	CT 223 or CT 226	
Relative compaction (%, min)	2 per day	CT 231	98

Notes:
[a] Random location sampling and testing does not apply.

28-6.01D(5) Acceptance Criteria

RCC base is accepted based on the Department's testing for the quality characteristics shown in the following table:

Concrete Base Acceptance Criteria

Quality characteristic	Requirement		Test
Compressive strength at 28 days (psi, min) [a, b]	Class A	Class B	ASTM C 1435; CT 521
	2,800	1,500	
Compressive strength at max age allowed (psi, min) [a, b]	3,600	2,100	
Air content [c, d]	Section 90-1		CT 504
Relative Compaction (%, min) [a]	98		CT 231

[a] A single test represents no more than 1,000 cu yd
[b] The Engineer calculates compressive strength by averaging the individual test results of 2 cylinders. The difference in the individual test results of two cylinders the same age must not exceed 10 percent of the average.
[c] If air entrainment is specified or optionally used, air content tests must be performed.
[d] A single test represents no more than one day's paving.

Other base quality characteristics are considered in determining final acceptance. Acceptance of strength, thickness, placement, smoothness, and air content, does not constitute final base acceptance.

28-6.02 MATERIALS

28-6.02A General

Not Used.

28-6.02B RCC Base

RCC base must comply with section 90-6 <Roller Compacted Concrete>.

Choose a maximum aggregate size that is less than one third of the lift thickness you are placing.

Aggregate for Class A RCC base may contain crushed portland cement concrete.

Aggregate for Class B RCC base may contain crushed portland cement concrete and crushed asphalt concrete. The maximum amount of crushed asphalt concrete is 10 percent of the mass of the total aggregate.

28-6.03 CONSTRUCTION

28-6.03A General

Not Used

28-6.03B Subgrade

Immediately before placing RCC base, 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 RCC base. RCC base used to fill low areas of subgrade is not included in the quantity of RCC base for payment.

28-6.03C Construction Joints

Construct transverse construction joints by placing and compacting the concrete beyond the joint location a sufficient distance so the base is full thickness at the construction joint location. Saw cut the RCC base at the construction joint location full depth and remove excess concrete.

Construct longitudinal construction joints by sawing the older concrete full depth and removing the edge. If the older concrete is existing or new LCB, JPCP or CRCP cut as close to the edge as possible to create a vertical edge. If the older concrete is RCC, cut 1.2 times the concrete thickness from the edge.

28-6.03D Placing RCC Base

Place RCC base using equipment specifically designed or adapted for placing RCC. Compact RCC base with steel tired rollers, rubber tired rollers or a combination of both. The minimum compacted thickness of a lift is 0.33 ft. The maximum thickness of a lift is 0.50 ft unless a high density paving machine is used and then the maximum is 0.83 ft compacted thickness.

When RCC base is placed in multiple lifts, place the subsequent lift on compacted RCC base that was placed less than 45 minutes before. Keep the surfaces of the prior lift damp until it is covered.

Place RCC base adjacent to previously placed RCC base within 60 minutes of mixing the previously placed concrete or construct a construction joint. Keep the previously placed RCC base surface damp until it is covered or cured.

Unless shown or specified, construct RCC base in minimum widths of 12 feet separated by construction joints. For RCC base constructed monolithically in widths greater than 60 times the thickness, construct longitudinal contraction joints no less than 12 feet apart and no more than 60 times the RCC base thickness apart.

Longitudinal contraction joints must be constructed with a power driven saw with a diamond blade.

For RCC base to be paved with concrete pavement, construct longitudinal construction and contraction joints in RCC base to provide at least 1 foot horizontal clearance from planned longitudinal construction and contraction joints in the concrete pavement.

Do not mix or place RCC base when the atmospheric temperature is below 35 degrees F.

28-6.03E Finishing

Finishing must produce a smooth and true-to-grade finish.

For RCC base to be paved with concrete pavement, use rubber tired rollers or rubber coated steel drum rollers to produce a finish free from cracks or fissures. If allowed, you may apply a cement slurry to fill cracks and fissures and remove all slurry from the surface.

Allow enough time to complete finishing activities during daylight. Work may continue after daylight if the Engineer accepts the lighting you provide.

For RCC base to be paved with HMA, the finished surface must not vary more than 0.05 foot from the grade established by the Engineer.

For RCC base 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.

28-6.03F Curing

Cure the RCC base exposed surfaces under section 90-1.03B< Curing Concrete > using the waterproof membrane method or curing compound method. If using the curing compound method use curing compound 1, 2 or 3. If the base is to be paved with HMA do not use curing compound 3.

Apply curing compound with mechanical sprayers in two applications. Complete the first application at a nominal rate of 150 sq ft/gal. Complete the second application at a nominal rate of 300 sq ft/gal with the nozzles offset 50 percent of the nozzle spacing form the first application, except if curing compound 3 is used the second application must be at a rate of 150 sq ft/gal. Reapply curing compound to saw cuts and disturbed areas.

28-6.03G Surfaces Not Within Tolerance

Where RCC base will be paved with concrete pavement, grind the surface with either a diamond or carborundum blade to within tolerance. After grinding RCC base to be paved with concrete pavement and after all free water has left the surface, clean foreign material and grinding residue from the surface. Apply curing compound to the ground area at a rate of approximately 150 ft sq/gal.

Where the surface of RCC base is lower than 0.05 foot from the grade established by the Engineer, fill low areas according to the pavement material as follows:

1. For HMA pavement, fill low areas with HMA that complies with the specifications for the lowest layer of pavement. Do not fill low areas concurrently with the paving operation.
2. For concrete pavement, fill low areas with pavement concrete concurrent with the paving operation.

28-6.04 PAYMENT

Not Used.

28-7 REPLACE BASE

28-7.01 GENERAL

Section 28-7 includes specifications for removing existing base and constructing base where the base underlies an individual slab to be replaced.

Sections 15-2.02B and 15-3 do not apply to replace base.

RSCB must comply with section 28-3.

LCBRS must comply with section 28-4.

28-7.02 MATERIALS

Base must be one of the following:

1. RSCB
2. LCBRS

28-7.03 CONSTRUCTION

Do not remove the base with the overlying pavement. Remove only the portion that can be replaced during the same lane closure. If you fail to complete the replacement during the same traffic closure, construct temporary roadway pavement structure under section 41-1.

The limits and depth shown for replacing base are approximate. After you remove the overlying pavement, the Engineer determines the exact limits and depth of base replacement. Obtain authorization before saw cutting the base.

Before removing base, saw-cut the outline of the base removal area. Using a power-driven saw, cut on a neat line that is perpendicular to the pavement surface. If the existing base is either cement treated base or concrete base, make the cut full-depth. If the existing base is neither cement treated nor concrete, make the cut at least 2 inches deep.

Removal methods must not damage the base to remain in place. Do not impact base within 18 inches horizontally of the base to remain in place.

After removing base, grade the remaining material under section 19-1.03C and compact it under section 19-5.03A.

If you remove material below the authorized depth, fill these areas by placing additional base material in the same operation as placing the new base.

28-7.04 PAYMENT

The Engineer measures replace base using the authorized limits and depth.

The Department does not pay for filling areas below the authorized removal depth.

28-8 ALTERNATE TREATED BASE

28-8.01 General

28-8.01A Summary

Section 28-7 includes specifications for placing treated base using any of the following:

1. LCB under section 28-2
2. Roller compacted concrete base under section 28-7
3. Lean concrete base rapid setting under section 28-4
4. HMA Type C using the Standard construction process under section 39.

28-8.01A Definitions

Not Used

28-8.01A Submittals

Not Used

28-8.01A Quality Control and Assurance

The following quality characteristics do not apply to HMA Type C:

1. Percent of maximum theoretical density
2. Stabilometer value

3. Air void content
4. Voids filled with asphalt
5. Voids in mineral aggregate
6. Dust proportion
7. Smoothness

28-8.02 Materials

The grade of asphalt binder mixed with aggregate for HMA Type C must be PG 64-16.

Increase the amount of asphalt binder mixed with aggregate for HMA Type C by 1.0 percent over the optimum binder content determined for use in HMA Type C under California Test 367.

28-8.03 Construction

Whenever placing a concrete base beneath concrete pavement, place base bond breaker between the base and pavement. Base bond breaker must comply with section 31-2.

When using HMA Type C, apply white pigmented curing compound to the finished surface of the HMA Type A within 2 days of placing PCC pavement. The curing compound must comply with ASTM C 309, Type 2, Class A. Apply curing compound in 2 separate applications to the area to be surfaced with PCC pavement. Apply curing compound at the rate of 1 gal/150 sq ft.

28-8.04 Payment

Alternate treated base is measured from the dimensions shown. Increased quantities of aggregate base or aggregate subbase resulting from the alternate treated base selected are not paid for.

7. BASE BOND BREAKER

Replace section 31 with:

31 BASE BOND BREAKER

31-1 GENERAL

31-1.01 GENERAL

31-1.01A Summary

Section 31-1 includes specifications for placing base bond breaker between concrete pavement and either concrete bases or cement treated bases.

Base bond breaker must be placed on the base surface before paving.

31-1.01B Definitions

Not Used

31-1.01B Submittals

Submit a certificate of compliance for each lot of base bond breaker material delivered.

31-1.01B Quality Control and Assurance

Not Used

31-1.02 MATERIALS

Base bond breaker no. 1 must be PG asphalt binder, Grade PG 64-10.

Base bond breaker no. 2 must be curing compound no. 3.

Base bond breaker no. 3 must be white opaque polyethylene film under ASTM C 171 except the minimum thickness must be 6 mils.

Base bond breaker no. 4 must be white curing paper under ASTM C 171.

Base bond breaker no. 5 must be geosynthetic bond breaker.

Use base bond breaker no. 1, 2 or 5 on concrete base and LCB.

Use base bond breaker no. 3, 4, or 5 on lean concrete base rapid setting, CTPB, and rapid strength concrete base.

31-1.03 CONSTRUCTION

31-1.03A General

Before placing base bond breaker, remove foreign and loose materials from the base.

Do not place base bond breaker until the base has cured. Allow base bond breaker nos. 1 and 2 to cure before paving.

Base bond breaker must be covered with pavement within 72 hours.

31-1.03B Placing Base Bond Breaker

Apply base bond breaker no. 1 in one application at a uniform rate from 0.09 to 0.15 gal/sq yd over the entire base surface area. Allow at least 4 hours for curing.

Comply with Section and 90-1.03B(3)(c) for mixing base bond breaker no. 2. Apply base bond breaker no. 2 at a uniform rate of at least 0.12 gal/sq yd over the entire base surface area. You may apply base bond breaker in more than one coat. Allow at least 4 hours for curing.

Base bond breakers no. 3 and 4 must not be wrinkled. Overlap adjacent sheets a minimum of 6 inches and in the same direction as the concrete pour. Tape or bond the sheets together as needed to prevent sheets from folding or wrinkling. Secure the bond breaker sufficiently so that it remains in place during concrete pavement placement. Ensure that no concrete gets under the bond breaker.

Base bond breaker no. 5 must not be wrinkled. Overlap adjacent sheets a minimum of 8 inches in the same direction as the concrete pour. Overlap no more than three layers at any location. Secure bond breaker to the base with pins or nails punched through galvanized washers or discs 2–2.75-inches in diameter spaced less than 6 ft apart in each direction except along edges spacing must be less than 3 ft. If bond breaker moves or wrinkles while placing concrete pavement increase the frequency of fasteners. Ensure that no concrete gets under the bond breaker.

31-1.04 PAYMENT

Not used

8. CONCRETE PAVEMENT

40 CONCRETE PAVEMENT

Replace the paragraphs in section 40 with:

40-1 GENERAL

40-1.01 GENERAL

40-1.01A Summary

Section 40-1 includes general specifications for constructing concrete pavement.

40-1.01B Definitions

concrete raveling: Progressive disintegration of the pavement surface resulting from dislodged aggregate.

full depth crack: Crack that runs from one edge of the slab to the opposite or adjacent side of the slab, except a crack parallel to and within 0.5 foot of either side of a planned contraction joint

working crack: Crack that extends through the full depth of the slab and is parallel to and within 0.5 foot of either side of a planned contraction joint.

action limit: Value at which corrective actions must be made while production may continue.

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 material

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 Texas Transportation Institute (TTI). The certification must not be more than 12 months old.
2. Operator certification for the IP issued by TTI. The operator must be certified for each different model of IP device operated. The certification must not be more than 36 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 measurements, submit a report of areas requiring smoothness correction.

40-1.01C(8) Coefficient of Thermal Expansion

Fabricate test specimens from a single sample of concrete for coefficient of thermal expansion testing under AASHTO T 336. Submit 4 test specimens for assurance testing. Submit your test data at:

http://169.237.179.13/cte/

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, provide materials, labor, and assist the Engineer in filling the Department's molds. The Department fabricates and tests beams aged 10 and 28 days. 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) Just-In-Time-Training

Not Used

40-1.01D(3) 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
   - 4.2. Concrete plant manager
   - 4.3. Concrete plant operator
   - 4.4. Personnel performing saw cutting and joint sealing

Do not start paving activities including test strips until the listed personnel have attended a prepaving conference.

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 for Portland Cement Concrete

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

Not Used

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, test concrete properties at the frequencies shown in the following table:

Concrete 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 (freeze thaw)[a]	California Test 504	1 per hour
Air content (non-freeze thaw)[a]	California Test 504	1 per 4 hours
Density	California Test 518	1 per 4 hours
Penetration	California Test 533	1 per 4 hours
Moisture[b]	California Test 223 or 226	1 per day

[a] If air entrainment is required, the frequency is 1 per hour. If air entrainment is not required, the frequency is 1 per 4 hours.
[b] Check calibration by comparing moisture meter reading with CT 223 or CT 226 test result.

If air entrainment is required, your testing laboratory and tester must be qualified under the Department's *Independent Assurance Manual*. The manual is available at the METS web site.

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 ±1.0 percent of the specified value. If no value is specified, the action limit is ±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

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

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.

IP equipment must display a current certification decal with expiration date.

Operate the IP according to the manufacturer's recommendations and AASHTO R57-10 at 1-inch recording intervals and a minimum 4 inch line laser sensor.

Notify the Engineer 2 business days before performing IP calibration and verification testing.

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 R57-10, section 5.3.2.3.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under AASHTO R57-10, section 5.3.2.3.2.
3. DMI test. Calibrate the accuracy of the testing procedure under AASHTO R56-10, section 8.4.
4. Manufacturer's recommended tests.

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 R56-10 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross correlation must be a minimum of 0.92.

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.

Notify the Engineer of start location by station and start time at least 2 business days before profiling.

Before testing the pavement smoothness, remove foreign objects from the surface, and mark the beginning and ending station on the pavement shoulder.

Determine IRIs using the ProVAL ride quality analysis with a 250 mm filter. 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

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.

Profiling 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 raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD_TTCCCRRR_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 (i.e., 10+20) or beginning post mile to the nearest hundredth (i.e., 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 (i.e., "concrete", etc.)

Electronic PPF files that do not follow this standardized naming convention will be rejected.

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 filter. Your report of areas requiring smoothness correction must include the following information:

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 (i.e., 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(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 properties at the minimum frequencies shown in the following table:

Department Pavement Testing

Property	Test Method		Frequency[a]
	CRCP	JPCP	
Modulus of rupture (28 day)	California Test 523		1,000 cu yd
Air content [b]	California Test 504		1 day's paving
Dowel bar placement	--	Measurement[a]	700 sq yd
Tie bar placement	--	Measurement[a]	4,000 sq yd
Thickness	California Test 531		1,200 sq yd
Coefficient of friction	California Test 342		1 day's paving

[a] A single test represents no more than the frequency specified
[b] Tested only when air entrainment is specified

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:

$$t = \frac{\left|\overline{X}_c - \overline{X}_v\right|}{S_p\sqrt{\frac{1}{n_c} + \frac{1}{n_v}}} \qquad \text{and} \qquad S_p^2 = \frac{S_c^2(n_c - 1) + S_v^2(n_v - 1)}{n_c + n_v - 2}$$

where:

n_c = Number of your quality control tests (minimum of 6 required)
n_v = Number of Department's tests (minimum of 2 required)
$\overline{X}_c$ = Mean of your quality control tests
$\overline{X}_v$ = 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 tcrit, using degrees of freedom showing in the following table:

degrees of freedom (nc+nv-2)	tcrit (for α = 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 cored. Core each day's paving within 2 business days at the following frequency:

1. Each dowel bar test consists of 2 cores, 1 on each dowel bar end to expose both ends and allow measurement.
2. Each tie bar test consists of 2 cores with 1 on each tie-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 are unconsolidated concrete around the dowel or tie bars, core additional specimens 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) Smoothness

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

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

Perform coefficient of thermal expansion testing under AASHTO T 336 at mix design and field qualification for each mix. Perform test of 5 samples and report results of each test, average of 5 tests, and standard deviation. For field qualification, collect 5 samples from separately prepared concrete batches.

If average result at field qualification is 5.0 microstrain/degree Fahrenheit or more, perform coefficient of thermal expansion testing under AASHTO T 336 at frequency of 1 test for each 5,000 cu yd of paving but not less than 1 test for projects with less than 5,000 cu yd of concrete.

40-1.01D(7)(b) Acceptance Criteria

40-1.01D(7)(b)(i) General

Not Used

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 ±1.5 percent of the specified value. If no value is specified, the air content must be within ±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:

Tie Bar Tolerance

Dimension	Tolerance
Horizontal and vertical skew	5 1/4 inch, max
Longitudinal translation	± 2 inch
Horizontal offset (embedment)	± 2 inch
Vertical depth	1. At least 1/2 inch below the bottom of the saw cut 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom

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	3/8 inch, max
Vertical skew	3/8 inch, max
Vertical depth	The minimum distance measured from concrete pavement surface to any point along the top of dowel bar must be: DB + 1/2 inch where: DB = one third of pavement thickness in inches, or the saw cut depth, whichever is greater The maximum distance below the depth shown must be 5/8 inch.

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.

40-1.02 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

Pavement 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, loss on the Los Angeles Rattler Test (CT 211) after 500 revolutions must not exceed 25 percent.

For combined aggregate gradings:

1. Use the 1-1/2 inch maximum grading.
2. 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.

40-1.02C 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. Aggregate filler must comply the grading shown in the following table:

Aggregate Filler Grading

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

40-1.03 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 for the work under section 17.

40-1.03C Test Strips

Section 40-1.03C applies to each type of pavement with a quantity of more than 2,000 cu yd. Before paving, construct a test trip and obtain authorization. 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 Engineer does not complete the evaluation within 3 business days, you may begin paving. If the test strip is noncompliant, stop paving

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 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 fastenerper 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

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 40-1.03L(2) and 40-1.03L(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 ± 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

Not Used

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 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the pavement's outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement's outside edge.

Do not apply 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.

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 50 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 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.

40-1.03O Shoulder Rumble Strip

40-1.03O(1) General

Construct shoulder rumble strips by 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) 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 the JPCP 3 feet on either side 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 0.1 foot
2. Wider than 0.1 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)(vi).

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)(vi).

Allow 25 days for the Department's coefficient of friction retesting.

40-1.04 PAYMENT

The deduction for pavement thickness deficiency is shown in the following table:

Deduction for Thickness Deficiency

Average thickness deficiency (foot)[a]	Deduction($/sq yd)
0.01	0.90
0.02	2.30
0.03	4.10
0.04	6.40
0.05	9.11
[a]Values greater than 0.01 are rounded to the nearest 0.01 foot.	

The Department does not pay for the portion of concrete that penetrates treated permeable base.

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..

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.

Class 1 permeable material, filter fabric, and slotted plastic pipe cross drain as shown for pavement anchors must comply with section 68-3.

40-2.01B Definitions

Not Used

40-2.01C Submittals

Not Used

40-2.01D Quality Control and Assurance

40-2.01D(1) General

Not Used

40-2.01D(2) Testing for Coefficient of Thermal Expansion

The average coefficient of thermal expansion for each lot must not exceed 5.5 microstrain/degree Fahrenheit and no single test result may exceed 6.2 microstrain/degree Fahrenheit.

40-2.02 MATERIALS

40-2.02A General

Not Used

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.

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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

Not Used

40-2.03B Test Strips

Comply with section 40-1.03C except during the 3 day evaluation, the Engineer checks placement tolerances for reinforcement instead of dowel and tie bars.

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.

40-2.03G Repair and Replacement

40-2.03G(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 at least 6 inches by 6 inches will require partial depth repair under Guarantee Section 6-3.06. CRCP that develop 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

40-2.03G(2) Partial Depth Repair

1. Determine a rectangular boundary of the repair area. The rectangular boundary area extends 6 inches beyond the visible area. Repair area areas are square or rectangular. Saw the rectangular area with a diamond-impregnated blade at a maximum depth of 1/3 the pavement thickness.
2. Remove the concrete using jackhammers with a maximum weight of 15 lbs. Start the removal of concrete at the center portion of the repair area and proceed toward the repair boundaries. If the removal of concrete is difficult, additional saw cutting the distressed concrete into smaller pieces can facilitate the removal operation. Remove unsound and damaged concrete between the saw cut and the joint and to the saw cut's depth. Do not use a pneumatic hammer heavier than 15 pounds. Do not damage concrete pavement to remain in place.
3. Dispose of removed concrete pavement and clean the repair area.
4. If each length of the repair boundaries is equal to or greater than 3 ft, install #5 hook bars in both longitudinal and transverse directions at 1 foot spacing. The hook bars length is equal to a half slab thickness, meeting the requirements of Section 52, Reinforcement.
5. Drill vertical holes at 2-in depth for hook bars. Clean the holes with oil-free compressed air.
6. Inject chemical adhesive in the hole and insert hook bar. The amount of the chemical adhesive should be just enough to fill the holes after hook bars are inserted.
7. Clean the repair area's exposed surfaces with high pressure abrasive water blasting. Further clean and dry the exposed surfaces with compressed air free of moisture and oil.
8. Install joint form board to prevent bonding of the sides of planned joints.
9. Apply epoxy under section 95 for epoxy resin adhesive to the entire surface area of the repair area for bonding new concrete to old concrete. Apply the epoxy resin in uniform coating with a stiff bristle brush.
10. Apply a portland cement concrete or mortar patch immediately following the epoxy application.

40-3.03G(3) Full Depth Repair

Removal of CRCP must be full depth except for portion of longitudinal bars to remain. Make initial full depth transverse saw cuts normal to the lane line a distance of 3 feet on each side of the transverse crack. Fill the saw cuts extending beyond the removal limits with grout specified under section 51-1.02F. Make a partial second saw cut just above the longitudinal bar reinforcement 2 feet from the full depth saw cut. The remaining pavement below the bar reinforcement must be removed by chipping the pavement manually. Do not damage the bar reinforcement. Leave the pavement face inclined no more than 1:12 (horizontal:vertical) into the removal area. Place additional bars and tie them to the longitudinal bar. Fill the removed CRCP with concrete.

Replace unconsolidated concrete.

If you damage existing bar reinforcement during removal, lengthen the removal area as needed for the lap splice lengths. Perform another partial depth saw cut just above the longitudinal bars. Remove the

remaining pavement below the bar reinforcement by chipping the pavement manually with the face of the concrete pavement inclined no more than 1:12 (horizontal:vertical) into the removal area.

You may make additional saw cuts within the removal area to facilitate pavement removal or to alleviate binding of the saw cut at the removal area's edge.

Prevent base damage and prevent spalling of the pavement remaining in place. Remove and replace base material disturbed during removal. If concrete is used as base, place CRCP after the concrete base has gained sufficient strength to prevent displacement. Place a minimum 4-mil thick polyethylene sheet between the base and new pavement

For transverse joints, connect longitudinal bar reinforcement with lap splices under section 52-6.03B.

For longitudinal joints, drill and bond tie bars under section 40-1.03H.

For tie bars placed into chemical adhesive-filled holes, the bond strength must be 3/4 of the tie bar yield strength under ASTM E 488. Test 10 the tie bars within 18 hours of inserting the tie bar into the adhesive-filled hole on each day of paving. If the bond strength in two or more tie bars is noncompliant,test another 10 tie bars. If any of the second 10 tie bars do not meet the required bond strength, increase the embedment depth and retest. Repair damage from testing. Do not place CRCP until the required bond strength is compliant.

Saw cut and seal expansion joints in the repair area. Use preformed sponge rubber expansion joint filler for expansion joints and longitudinal joints. Preformed sponge rubber expansion joint filler must comply with ASTM D 1752.

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

Not Used

40-4.01C Submittals

Not Used

40-4.01C(1) General

Not Used

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

40-4.01D Quality Control and Assurance

40-4.01D(1) General

Not Used

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) Testing for Coefficient of Thermal Expansion

If the average coefficient of thermal expansion for each lot exceeds 5.5 microstrain/degree Fahrenheit or a single test result exceeds 6.2 microstrain/degree Fahrenheit during field qualification, you may do one of the following:

1. Reduce maximum transverse joint spacing to 12.5 feet.
2. Modify batch process for mixing concrete to reduce coefficient of thermal expansion.
3. Obtain new source of aggregate and perform new mix design and field qualification.

If the average coefficient of thermal expansion exceeds 7.0 microstrain/degree Fahrenheit, obtain new aggregate source.

During production, if 2 consecutive tests exceed 6.2 microstrain/degree Fahrenheit without reducing maximum transverse joint spacing and/or one test exceeds 7.0 microstrain/degree Fahrenheit, stop operation and perform a new field qualification.

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 a joint filler. Avoid filling material to penetrate into the joint, if joints are not sealed. .

40-4.03B Tie Bar Placement

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

40-4.03C Ramp Termini

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

40-4.03D Removal and Replacement

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

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

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

Construct transverse and longitudinal construction joints between the new slab and existing concrete. If slabs are constrained at both longitudinal edges by existing pavement, use dowel bars instead of tie bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bar holes from the original dowel bar by 3 inches.

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

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

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

40-4.04 PAYMENT

If extra transverse joints are required, no additional payment is made for the 2 inch full depth drilled hole.

40-5 RESERVED

40-6 JOINTED PLAIN CONCRETE PAVEMENT WITH ROLLER COMPACTED CONCRETE

40-6.01 GENERAL

40-6.01A Summary

Section 40-6 includes specifications for constructing JPCP with roller compacted concrete (RCC) for concrete shoulders or temporary detours. Section 40-4 applies.

Provisions of 40-1 regarding modulus of rupture do not apply to JPCP RCC. 40-1.01D(5) does not apply

40-6.01B Definitions

Not Used

40-6.01C Submittals

40-6.01C(1) Mix Design

At least 30 days before starting field qualification, submit the proposed concrete mix proportions, the corresponding mix identifications, and laboratory test reports including the strength for each trial mixture at 3, 7, 28, and 42 days. If the mix proportions qualify the mix to allow 56 days to attain the strength under 90-1.01D(5)a, also submit the strength test results for 56 days.

40-6.01D Quality Control and Assurance

40-6.01D(1) General

Not Used

40-6.01D(2) Quality Control Plan

A process is out of control if the average of 4 consecutive density tests is below 98 percent or 1 test is below 96 percent

The QC plan must address achieving density.

40-6.01D(3) Quality Control Testing

Select random locations and perform sampling and testing for the tests shown in the following table:

Quality Control Testing

Test	Frequency	Test method
In-place Density	2 / 1500 CY	ASTM C 1040

40-6.01D(4) Mix Design

Section 40-1.01D(5) does not apply.

Make trial mixtures no more than 24 months before field qualification.

Strength used to determine the mixture proportions must be at least 4000 psi at 28 days age and at least 5000 psi at 42 days age. If the mix proportions qualify the mix to allow 56 days to attain the strength under 90-1.01D(5)a the strength must be at least 3500 psi at 28 days and 5000 psi at 56 days.

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.

40-6.01D(5) Acceptance Criteria

40-6.01D(5)(a) General

JPCP RCC is accepted based on the Department's testing for the concrete pavement quality characteristics shown in the following table:

Concrete Pavement Acceptance Criteria

Quality characteristic	Quantity †	Test
28-day compressive strength	1,000 CY	ASTM C 1435; CT 521
In-place density	1500 CY	ASTM C 1040

† A single test represents no more than the quantity specified.

40-6.01D(5)(b) Field Qualification

Field qualification is accepted if five test cylinders made under ASTM C 1435 and tested under CT 521 comply with the following:

1. At a minimum, cylinders are tested at 3, 7, and 28 days of age
2. At an age not later than 28 days, no single specimen is less than 3500 psi or at an age not less than the maximum allowed, no single specimen is less than 5000 psi.

40-6.01D(5)(c) Compressive Strength

JPCP RCC is accepted for strength on a lot basis. The minimum strength each lot is 4000 psi at 28 days or 5000 psi at the maximum age allowed. Department calculates the compressive strength by averaging the individual test results of 2 cylinders. Difference in the individual test results of two cylinders the same age must not exceed 8 percent. The Engineer calculates the difference relative to the average of the 2 test results.

40-6.01D(5)(d) Testing for Coefficient of Thermal Expansion

Testing for coefficient of thermal expansion does not apply to RCC.

40-6.02 MATERIALS

40-6.02A General

Not Used.

40-6.02B Concrete

Concrete for JPCP RCC must comply with section 90-6 <Roller Compacted Concrete>.

40-6.02C Cementitious Material

Concrete for JPCP RCC must contain at least 450 pounds of cementitious material per cubic yard.

40-6.02D Aggregate

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

For the surface lift use the 1/2-inch or the 3/4-inch maximum size grading. For other than the surface lift choose any maximum size aggregate grading. Choose a maximum size that is less than one third of the lift thickness you are placing.

40-6.03 CONSTRUCTION

40-6.03A General

Section 40-1.03G does not apply.

40-6.03B Joints

40-6.03B(1) General

Construct longitudinal joints as construction joints or isolation joints.

40-6.03B(2) Construction Joints

Construct transverse construction joints by placing and compacting the concrete beyond the joint location a sufficient distance so the pavement is full thickness at the construction joint location. Saw cut the JPCP RCC at the construction joint location full depth and remove excess concrete.

Construct longitudinal construction joints by sawing the older pavement full depth and removing the edge of pavement. If the older pavement is existing or new JPCP or CRCP cut as close to the edge as possible to create a vertical edge. If the older pavement is RCC cut 1.2 times the pavement thickness from the edge.

40-6.03C Placing Concrete

40-6.03C(1) General

Section 40-1.03H does not apply.

Place RCC using equipment specifically designed or adapted for placing RCC. Produce a uniform surface without tearing, shoving, gouging or signs of segregation. Compact RCC with steel tired rollers, rubber tired rollers or a combination of both. The minimum compacted thickness of a lift is 4 inches. The maximum thickness of a lift is 6 inches unless a high density paving machine is used and then the maximum is 10 inches compacted thickness. Compact RCC to 98 percent relative compaction, minimum.

When JPCP RCC is placed in multiple lifts, place the subsequent lift on compacted RCC that was placed less than 45 minutes before. Keep the surfaces of the prior lift damp until it is covered.

Place RCC adjacent to previously placed RCC within 60 minutes of mixing the previously placed concrete or construct a construction joint. Keep the previously placed RCC surface damp until it is covered or cured.

40-6.03C(2) Surface Treatment of Adjacent Existing Pavement

If JPCP RCC is placed adjacent to existing pavement not constructed as part of the contract, grind the existing pavement lane or shoulder adjacent to the new concrete pavement. Perform the grinding before new concrete pavement is placed. The new concrete pavement must match the elevation of the existing pavement after grinding. Grind existing concrete pavement under section 42-2 <Grinding> except profile index must comply with the pavement smoothness specifications in section 40-1.01D <Quality Control and Assurance>.

40-6.03D Preliminary Finishing

Section 40-1.03L does not apply

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day's concrete pavement 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 that remains from 1/8 to 1/4 inch deep after final finishing. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day's start of paving and 1 ± 0.25 foot from the concrete 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 concrete pavement's outside edge.

Use rubber tired rollers or rubber coated steel drum rollers to produce a finish free from cracks or fissures. If allowed, you may apply a cement slurry to fill cracks and fissures and remove all slurry from the surface.

Allow enough time to complete finishing activities during daylight. Work may continue after daylight if the Engineer accepts the lighting you provide.

40-6.03E Curing

Section 40-1.03N does not apply

Cure the concrete pavement's exposed area under section 90-1.03A< Curing Method > using the waterproof membrane method or curing compound method. If using the curing compound method use curing compound 1 or 2.

Apply curing compound with mechanical sprayers in two applications. Complete the first application at a nominal rate of 150 sq ft/gal. Complete the second application at a nominal rate of 300 sq ft/gal with the nozzles offset 50% of the nozzle spacing form the first application. Reapply curing compound to saw cuts and disturbed areas.

40-6.03F Final Finishing

Final finishing is performed after curing and the concrete is strong enough to finish without spalling or dislodging aggregate particles. Apply one of the following final finishes:

1. Grind the entire width of the JPCP RCC
2. Groove the entire width of the JPCP RCC
3. No additional finishing

On a continuous length of JPCP RCC is less than 2000 feet apply one final finish to the entire surface. On lengths that are greater than 2000 feet long, you may use two or more finial finish surfaces provided that no length of any one finish is less than 3000 feet or one half the continuous length of JPCP RCC, whichever is shorter.

When the smoothness requirements of 40-1.01D are not met, grind the pavement under section 42 to comply with 40-1.01D(10).

When the smoothness requirements of 40-1.01D are met and the coefficient of friction is less than 0.30 when tested under California Test 342, groove or grind the pavement under section 42 to achieve a coefficient of friction of at least 0.30.

When the smoothness requirements of 40-1.01D are met and the coefficient of friction is at least 0.30 when tested under California Test 342, no additional finishing is required and you may grind or groove the pavement under section 42.

Open the pavement to public traffic only after final finishing is complete and after 3 days.

40-6.04 PAYMENT

Not used

40-7 SHOULDER CONCRETE PAVEMENT

40-7.01 GENERAL

40-7.01A Summary

Section 40-X includes specifications for placing concrete pavement for roadway shoulders at the locations shown using the any of the following materials under the specified conditions:

1. JPCP under section 40-4
2. JCPC using roller compacted concrete under section 40-7
3. CRCP under section 40-2 if adjacent pavement is CRCP

40-7.01B Definitions

Not Used

40-7.01C Submittals

Not Used

40-7.01D Quality Control and Assurance

Not Used

40-7.02 MATERIALS

Not Used

40-7.03C CONSTRUCTION

Not Used

40-7.04D PAYMENT

Not Used

40-8 PRECAST PRESTRESSED CONCRETE PAVEMENT

40-8.01 GENERAL

40-8.01A Summary

Section 40-8 includes specifications for furnishing and installing precast prestressed concrete pavement (PPCP). Furnishing includes pretensioning individual pavement panels before casting. Installing includes post-tensioning precast panels in place.

Before submitting shop drawings, field verify the profile and grade information described,

For horizontal curves and transition to horizontal curves, PPCP should match the superelevation and superelevation transition of the roadway. If non-planer panels are needed, you may need to pay a royalty for existing patents.

Use dowel bars at connections between PPCP and the existing concrete. Comply with section 41-8 "Dowel Bar Retrofit".

Comply with Section 50 except where specified for prestressing.

40-8.01B Definitions

system: consists of features that are part of design, construction, and performance of the precast pavement product. These features are included, but are not limited to size and thickness of panels and slabs, joints, elements cast in the panels, load transfer method, techniques for providing grade control for the panels, etc.

40-8.01CSubmittals

Section 40-1.01C does not apply to PPCP.

Section 50-1.01C(3) does not apply to PPCP.

Submit PPCP shop drawings to the Engineer and to Office of Concrete Pavement and Pavement Foundation, MS # 5, 5900 Folsom Boulevard, Sacramento, CA 95819. Submit 4 sets to the Engineer and 1 set to the Office of Concrete Pavement and Pavement Foundation. Allow 3 weeks for review.

Shop drawings must include:

1. Details for furnishing PPCP panels including:
   - 1.1. The QCP under section 11-2
   - 1.2. Panel layout and coordinating panel identification system
   - 1.3. Your survey notes for field verification of the existing profile and grade information described
   - 1.4. Your adjusted panel dimensions including calculations for:
     - 1.4.1 Existing pavement profile with any superelevation or transition
     - 1.4.2 Allowable fabrication tolerances
     - 1.4.3. Allowable installation tolerances
   - 1.5. Method for casting connection elements within the specified alignment for final placement
   - 1.6. Base grout vent locations on the details shown for joint panels and central stressing panels and at the mid-point of ducts for base panels.
   - 1.7. Finishing methods and procedures
   - 1.8. Methods and procedures for handling and transport
2. Details, methods and procedures for installing PPCP panels including:
   - 2.1. Methods and procedures for handling panels
   - 2.2. Methods and procedures for supporting and adjusting grade of the PPCP during installation
   - 2.3. Methods and procedures for installing joint filler, joints, and joint seals
   - 2.4. Details and methods for connecting to the existing pavement
3. Detail method for repairing damaged during removal from the forms or transport and installation

Submit separate prestressing shop drawings for (1) prestressing at the casting yard and (2) post-tensioning during installation. The shop drawings must comply with Section 50-1.02, “Drawings”, of the Standard Specifications except (1) the 3rd and 6th paragraphs do not apply, and (2) do not send it to the Office of Structural Materials. Submit 1 set of shop drawings to the Office of Concrete Pavement and Pavement Foundation.

40-8.01D Quality Control and Assurance

40-8.01D(1) General

Section 40-1.01D does not apply.

Test the coefficient of thermal expansion for each mix design.

Hold the prepaving conference after submitting the shop drawings, and 2 weeks before beginning installation activities. Discuss methods of performing the installation work.

At the minimum, the meeting must be attended by your:

1. Project superintendent
2. Quality control manager
3. Installation construction foreman
4. Subcontractor's workers including:
   - 4.1. Fabricator’s project manager
   - 4.2. Personnel responsible for saw cutting, epoxy application, post-tensioning, fill access pockets, duct grouting, underslab grouting and joint sealing

40-8.01D(2) Quality Control Testing

Construct pavement test strips and obtain authorization of your test strips before starting other paving work. Test strips must comply with the authorized shop drawings and be:

1. At least 300 feet long and include at least 2 slabs
2. Same width as shown on the authorized shop drawings
3. Same cross-section dimensions as for the highest rate of superelevation as shown on the authorized shop drawings

Notify the Engineer at least 25 working days before you start test strip installation.

Allow 3 days for test strip review.

Construct additional test strips if you change:

1. Methods and equipment including:
   - 1.1. Fabrication plants
   - 1.2. Panel lifting, shipment, and delivery methods
   - 1.3. Post-tensioning devices
   - 1.4. Grouting equipment
   - 1.5. Connections to the existing pavement
2. Concrete mix for access pockets
3. Grout mix for under the slab

If you have successfully installed PPCP on a previous Department project and used the same fabrication plant, installation equipment and procedures, and personnel, you may request authorization to start precasting without a test strip. Your request must include supporting documentation from the previous Department project.

40-8.01D(2)(a) Testing for Coefficient of Thermal Expansion

Testing for coefficient of thermal expansion does not apply to precast prestressed concrete pavement. If Contractor uses a non-prestressed precast concrete pavement option, the requirements for coefficient of thermal expansion for JPCP in Section 40-4.01D(4) apply.

40-8.01D(3) Pavement Acceptance

40-8.01D(3)(a) General

Construct PPCP panels to the dimensions shown on the authorized shop drawings. PPCP panels are rejected if the fabricated dimensions are not within the tolerances shown in the following table:

PPCP Panel Fabrication

Dimension	Tolerances
Length (longer dimension)	+/- 1/4 inch
Width (shorter dimension)	+/- 1/8 inch
Nominal thickness	+/- 1/16 inch
Edge alignment straightness measured from a horizontal plane	+/- 1/8 inch
Skew at the ends	+/- 1/8 inch
Batter	+/- 1/16 inch
Position of pre-tensioning strands	+/- 1/8 inch, vertical[a]
	+/- 1/8 inch, horizontal
Position of post-tensioning ducts at transverse joints	+/- 1/8 inch, vertical[a]
	+/- 1/8 inch, horizontal
Straightness of post-tensioning ducts along the full length of duct	+/- 1/8 inch, vertical[a]
	+/- 1/4 inch, horizontal
Diagonal difference of the corner to corner measurement	+/- 1/8 inch
Position of lifting anchors	+/- 3 inches

[a]Measured from the bottom of the panel

The profile and grade of the finished PPCP must match the existing pavement including any superelevation and superelevation transition. PPCP panels are rejected if the installed alignments are not within the tolerances shown in the following table:

PPCP Panel Installation

Alignment	Tolerances
Vertical at transverse joints	+/- 1/4 inch
Vertical at longitudinal joints	+/- 1/4 inch
Horizontal at transverse joints	+/- 1/8 inch
Horizontal at longitudinal joints	+/- 1/4 inch

PPCP panels are rejected if:

1. There are voids more the 1/4 inch between base and bottom of panel.
2. Surface varies more than 0.02 foot from a 12-foot straightedge's lower edge
3. Wheel path's individual high points are greater than 0.025 foot in 25 feet
4. Final finishing does not comply with the specifications except coefficient of friction

40-8.01D(3)(b) Test Strips

If the test strip complies with the acceptance criteria except for the coefficient of friction, you may grind the test strip under section 42. If the test strip complies with the acceptance criteria after grinding. you may request to leave the test strip in place.

If the test strip does not comply with the panel alignment criteria, the test strip is rejected. Submit revised shop drawings that include your proposed changes to correct the alignment. After the revised submittals are authorized, install a new test strip. Repeat this process until the test strip complies with the acceptance criteria.

Remove and dispose of rejected test strips.

40-8.02 MATERIALS

40-8.02A General

Bond breaker must be white polyethylene sheeting and at least 6-mils thick. Sheeting must comply with ASTM C 171.

Epoxy for transverse joints must comply with Section 95, “Epoxy,” of the Standard Specifications.

Grout for post-tensioned prestressing steel in ducts must comply with Section 50-1.09, “Bonding and Grouting” of the Standard Specifications.

Grout for underslab grouting must comply with Section 41-2.

Polyester concrete must comply with section 41-1.

Tack coat must comply with section 39.

40-8.02B Prestressing

Prestressing must comply with section 50-1.02 except vents must be placed as specified on plans.

Transverse pretensioning strand must be 0.5 or 0.6 inch diameter, conforming to ASTM Designation: A 416, Grade 270 (low relaxation).

Longitudinal post-tensioning strand must be 0.6 inch diameter conforming to the requirements of ASTM Designation: A 416, Grade 270 (low relaxation).

40-8.02C Joint Seal

Joint seal for expansion joints must be Type B preformed elastomeric joint seal as specified in Section 51, "Concrete Structures," of the Standard Specifications and must accommodate a total movement of 1 inch.

Joint seal for isolation joint and joint between PPCP and existing concrete pavement must be preformed compression seal complying with section 41-5 “Joint Sealing”.

40-8.03 CONSTRUCTION

40-8.03A General

Prestressing must comply with section 50-1.03. The specifications for a "member" applies to a PPCP panel.

Where existing pavement is replaced with PPCP, replace only the portion of pavement where the work will be completed during the same lane closure. If installation of the PPCP is not completed during the same lane closure, you must comply with the specifications for temporary roadway pavement structure under section 41-9.

40-8.03B Furnishing PPCP

If the roadway alignment is on a curve with a radius of under 2, 500 feet, place the reinforcement along a single plane. If the curve does not allow the spacing shown between transverse bar reinforcement and

prestress, space them a distance that is between one half the specified spacing and the specified spacing. Before casting, grease the section of dowels extending into the expansion sleeve.

Lifting devises must be recessed at least 1/2 inch below the panel surface and a distance of at least 0.2L from any panel edge.

After casting and before curing, comply with section 40-1.03M.

Section 40-1.03N does not apply. Cure PPCP under section 90-4.

Section 40-1.03O does not apply.

Before shipping, PPCP must have a minimum compressive strength of 6,000 psi and must have cured for at least 14 days

40-8.03C Installing PPCP

40-8.03C(1) General

Before installing PPCP, clean and dry the surface of the base and place the bond breaker on it. The bond breaker must be free of wrinkles and overlapped at least 6 inches in the same direction as the panel installation.

Before placing the panels, seal stressing ducts at the transverse joints by either:

1. Placing a compressible foam or neoprene gasket around each duct opening. Do not cover the duct.
2. Placing a sleeve that extends from the duct in one panel to the duct in the next panel.

Sealing the stressing duct must not inhibit insertion of prestressing strand nor grouting.

Seal the transverse joints between panels by either applying epoxy before placement or injecting epoxy after final post-tensioning and grouting.

When applying epoxy before placement, use slow-setting epoxy such that you complete temporary post-tensioning before the epoxy sets. Apply the epoxy to the entire surface of the keyed joints except do not apply within 1/2 inch of a duct opening.

If a PPCP panel is adjacent to HMA, apply tack coat to HMA joint surfaces.

40-8.03C(2) Post-tensioning

After placing 3 adjacent panels, check the PPCP profile and grade and make adjustments, then use temporary post-tensioning to close the transverse joints.

Protect the keyways and temporarily post-tension the panels together until the transverse joints close. The maximum jacking force must not exceed 0.75 F_{pu}. Use elongated stressing pockets to accommodate the prestresssing ram. Strand for temporary tensioning must be 7-wire and either 0.5-inch or 0.6-inch diameter.

Remove the temporary strand before installing the strand for final post-tensioning.

Complete final post-tensioning within 3 days of placing PPCP panels when the panels are opened to traffic prior to post-tensioning.

40-8.03C(3) Grouting

After final post-tensioning and before grouting, fill access pockets with polyester concrete. Consolidate the polyester concrete in place and finish the surface to match the pavement surface. If cracks appear, replace the concrete. Use accelerated strength concrete if the pavement is to be opened to traffic within 3 hours of filling.

If access pockets are unable to be filled prior to opening to traffic, close the pockets with temporary covers to withstand traffic loading. Fasten the temporary covers to the panels so they are not disturbed or

dislodged by traffic and are flush with the surface of the pavement. Do not use other filler materials before final filling. Clean access pockets before filling.

Grout the stressing ducts as soon as possible and must be completed within 3 days of final post-tensioning.

Complete underslab grouting within 3 days of filling access pockets. Grouting must comply with the specifications for in section 41-2, except do not drill holes. Underslab grouting must occur prior to opening to traffic, if there are voids of 1/2 inch or greater beneath panels during placement.

40-8.03C(4) Joints

Seal joints for expansion joints, isolation joints, and joints between PPCP and existing concrete pavement. Comply with section 41-2.

Follow the manufacturer's specifications for reservoir dimensions and installation width of the joint seal. Adjust the width of the expansion joint on-site based upon the approximate ambient temperature at panel installation according to the following table:

Ambient Temperature (Ta*)	<200 foot Slab Length	>200 foot Slab Length
Ta < 60°F	1 inch	1-1/4 inch
60°F < Ta < 105°F	1/2 inch	3/4 inch
Ta > 105°F	1/4 inch	1/2 inch
* Do not install panels when Ta > 120°F		

40-8.03D Panel Repair

Repair panels damaged during removal from forms and handling in compliance with section 41-4, except polyester concrete must be used.. Repairs are required when any surface of the panel or the keyed panel edges are damaged and will affect ride quality, assembly of the panels, or long-term performance of the pavement. Repairs to keyways and adjoining panel edges must not protrude past the edge of the keyway and panel.

Treat the cracks that do not extend to the full depth of a panel with a high molecular weight methacrylate resin in compliance with section 41--3" Crack Treatment".

40-8.04 PAYMENT

Not used

9. CONCRETE PAVEMENT REPAIR

41 CONCRETE PAVEMENT REPAIR

Replace the paragraphs in section 41 with:

41-1 GENERAL

41-1.01 GENERAL

41-1.01A Summary

Section 41 includes specifications for repairing concrete pavement.

Dowel bars and dowel bar lubricant must comply with section 40-1.

41-1.01B Definitions

Not Used

41-1.01C Submittals

At least 15 days before delivering fast-setting concrete, polyester resin binder, or bonding agent to the job site, submit the manufacturer’s recommendations, instructions, and MSDS. Notify the Engineer if polyester resin binder will be stored in containers over 55 gallons.

41-1.01D Quality Control and Assurance

41-1.01D(1) General

Before using polyester concrete, allow 14 days for sampling and testing of the polyester resin binder.

41-1.02 MATERIALS

41-1.02A General

Water for washing aggregates, mixing concrete, curing, and coring must comply with section 90-1.02D.

Use the minimum amount of water to produce workable concrete and comply with the manufacturer's instructions.

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[a] at 3 hours at 24 hours	 California Test 551 California Test 551	 3,000 psi min 5,000 psi min
Flexural strength[a] at 24 hours	 California Test 551	 500 psi min
Bond strength[a] at 24 hours Saturated surface dry concrete Dry concrete	 California Test 551 California Test 551	 300 psi min 400 psi min
Water absorption	California Test 551	10% max
Abrasion resistance[a] at 24 hours	California Test 550	25 g max
Drying shrinkage at 4 days	ASTM C596	0.13% max
Water soluble chlorides[b] by weight	California Test 422	0.05% max
Water soluble sulfates[b] by weight	California Test 417	0.25% max
Thermal stability	California Test 553	90% min

[a]Perform test with aggregate filler if used.
[b]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[a,] Pa·s (RVT, No. 1 Spindle, 20 RPM at 77 °F)	ASTM D2196	0.075 to 0.200
Specific gravity [a,] at 77 °F	ASTM D1475	1.05–1.10
Elongation, %, Type I at 0.45 inch/min Thickness = 0.25 ± 0.05 inch	ASTM D638	35 min
	ASTM D618	Sample conditioning: 18/25/50 + 5/70
Tensile strength, psi, Type I at 0.45 inch/min Thickness = 0.25 ± 0.05 inch	ASTM D638	2,500 min
	ASTM D618	Sample conditioning: 18/25/50 + 5/70
Styrene content [a,] % (by weight)	ASTM D2369	40–50
Silane coupler, % (by weight of polyester resin binder)	--	1.0 min
PCC saturated surface dry bond strength, psi, at 24 hours and 70 ± 2 °F	California Test 551	500 min
Static volatile emission [a,] g /m^2, loss	South Coast Air Quality Management District, Method 309-91 [b]	60 max

[a]Test must be performed before adding initiator.
[b]For SCAQMD Method 309-91, Determination of Static Volatile Emissions, 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 propose alternate grading requirements or propose using manufactured sand as fine aggregate but 100 percent of the combined grading must pass the 3/8 inch sieve.

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 be produced from any combination of broken stone, crushed gravel, natural rough-surfaced gravel, reclaimed concrete, and sand that complies 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.

41-1.03 CONSTRUCTION

41-1.03A General

Repair only the portion of pavement where the work will be completed during the same traffic 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 within the 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 a 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 Bonding Agent Application

Mix the bonding agent at the job site under the manufacturer's instructions and in small quantities. 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 a damp surface that is not saturated or treated with a bonding agent recommended by the concrete manufacturer.

Place polyester concrete on a surface treated with a bonding agent.

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.

41-1.04 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

Not Used

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

Not Used

41-2.02 MATERIALS

41-2.02A General

Not Used

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 D 98.

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.

41-2.02E Mortar

Mortar must be a prepackaged fast-setting mortar that complies with ASTM C928.

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 rainwater 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:

1. Injected grout rises to the surface at any joint or crack, or flows into an adjacent hole.
2. If 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.

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.

41-2.03C 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.

41-2.03C(1) 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 42-3 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. Replace underlying base under section 28-7.

41-2.04 PAYMENT

Not used

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 pavement surface cracks that do not extend the full slab depth.

41-3.01B Definitions

Not Used

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 Plans

Before starting crack treatment, submit the following plans as shop drawings:

1. Public safety plan for HMWM
2. Placement plan for the construction activity
3. MSDS for each component of HMWM

The public safety plan and the placement plan must identify materials, equipment, and methods to be used.

The public safety plan must include 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.

41-3.01D 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.

41-3.01D(3) 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

Do not start crack treatment until the Engineer accepts the test area.

41-3.02 MATERIALS

41-3.02A General

Not Used

41-3.02B High-Molecular-Weight Methacrylate

HMWM consists of resin, promoter, and initiator. The promoter and initiator in used must be compatible. 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:

High-Molecular-Weight Methacrylate Resin

Property	Test method	Value
Viscosity [a]	ASTM D 2196	25 cP, maximum, (Brookfield RVT with UL adapter, 50 RPM at 77 °F)
Specific gravity [a]	ASTM D 1475	0.90 minimum, at 77 °F
Flash point [a]	ASTM D 3278	180 °F, minimum
Vapor pressure [a]	ASTM D 323	1.0 mm Hg, maximum, at 77 °F
Tack-free time	Specimen prepared under California Test 551	400 minutes, maximum, at 77 °F
Volatile content [a]	ASTM D 2369	30 percent, maximum
PCC saturated surface-dry bond strength	California Test 551	500 psi, minimum, at 24 hours and 77 ± 2 °F

[a] Test must be performed before adding initiator.

41-3.02C Sand

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 205.

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 REPAIR SPALLS

41-4.01 GENERAL

41-4.01A Summary

Section 41-4 includes specifications for repairing spalls in concrete pavement.

Polyester concrete, bonding agent, and water must comply with section 41-1.

41-4.01B Definitions

Not Used

41-4.01C Submittals

Not Used

41-4.01D Quality Control and Assurance

Not Used

41-4.02 MATERIALS

41-4.02A General

Use polyester concrete.

41-4.02B Joint Form Board

Joint form board must be either corrugated cardboard with a 6-mil polyethylene covering or expanded polystyrene material. Do not use polystyrene when polyester concrete is used.

41-4.03 CONSTRUCTION

41-4.03A General

Not Used

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 limits of removal, 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 3,000–6,000 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 Joint Form Board Installation

After cleaning, place the joint form board to match the existing joint alignment. Extend the joint form board at least 1 inch beyond the width and depth of the repair. Remove the joint form board before sealing joints or cracks.

41-4.03E Protecting Spall Repairs

Do not allow traffic on polyester concrete for at least 2 hours after time of final setting measured under ASTM C403/403M.

41-4.04 PAYMENT

Not used

41-5 JOINT SEALING

41-5.01 GENERAL

41-5.01A Summary

Section 41-5 includes specifications for sealing new concrete pavement joints or replacing existing concrete pavement joints. Use preformed compression seals for cracks and contraction, construction, and isolation joints in concrete pavement. Do not seal construction joints in CRCP or longitudinal construction joints in JPCP. Liquid joint sealant may be used for sealing cracks with approval of Department.

41-5.01B Definitions

Not Used

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.

41-5.02 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.

41-5.03 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.

41-5.03C 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 or 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 Seal

Install preformed compression joint seals using lubricant adhesive as shown 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.

41-5.04 PAYMENT

Not Used

41-6 CRACKING AND SEATING

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

Not Used

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 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 for the Engineer's verbal authorization.

Do not proceed with crack and seat activities until the Engineer informs you the test strip is acceptable. If QC test results are not available, you may proceed at your own risk.

41-6.01D(3) Coring

Drill cores at least 6 inches in diameter under ASTM C 42 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. Fill core holes with fast-setting concrete.

41-6.02 MATERIALS

41-6.02A General

Use fast-setting concrete under section 41-1.02B 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.

41-6.04 PAYMENT

Not used

41-7 TRANSITION TAPER

41-7.01 GENERAL

41-7.01A Summary

Section 41-7 includes specifications for constructing transition tapers in existing pavement.

41-7.01B Definitions

Not Used

41-7.01C Submittals

Not Used

41-7.01D Quality Control and Assurance

Not Used

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 taper before constructing the transition taper.

41-7.04 PAYMENT

Not used

41-8 DOWEL BAR RETROFIT

41-8.01 GENERAL

41-8.01A Summary

Section 41-8 includes specifications for retrofitting concrete pavement with dowel bars at transverse joints and cracks.

41-8.01B Definitions

Not used

41-8.01C Submittals

Submit each core in a plastic bag or tube for acceptance at the time of sampling. Mark each core with a location description.

41-8.01D Quality Control and Assurance

41-8.01D(1) General

Dowel bars must be placed such that the bar alignment is within the tolerances described and concrete surrounding the dowel bars is free of unconsolidated regions. The Department evaluates air voids and dowel bar placement by coring.

41-8.01D(2) Preinstallation Conference

Before starting dowel bar retrofit work, hold a pre-installation conference with the Engineer to review the work at a mutually agreed time and place. Provide a conference facility at a nearby location.

The pre-installation conference must be attended by personnel involved in cutting slots or placing dowel bars, including the project superintendent, construction foreman, subcontractors, and equipment operators. Conference attendees must sign an attendance sheet provided by the Engineer.

41-8.01D(3) Pre-installation Training

After the pre-installation conference and before cutting slots for dowel bars, provide pre-installation training for your personnel and the Engineer's representatives. Your trainer must be authorized by the Engineer. Hold the training at a mutually agreed upon time and place. Provide a training facility within 3 miles of the job site or at a nearby location.

Your attendees must be the same personnel who attended the pre-installation conference.

Training must:

1. Be 4 hours long
2. Cover dowel bar placement procedures
3. Held during normal working hours
4. Held no more than 2 weeks before placing dowels

You may request authorization of a waiver of the pre-installation training. If requesting a waiver, submit verification of prior compliant dowel retrofit work for the Department and evidence of prior training of your personnel.

41-8.01D(4) Test Strip

Before starting dowel bar retrofit work, retrofit a test strip with dowel bars at a location determined by the Engineer. The test strip must be at least 1 traffic lane wide and at least 100 yards long. Verify compliance of dowel bar placement. If dowel bar placement is noncompliant, construct another test strip at a location determined by the Engineer.

41-8.01D(5) Coring

One core test consists of exposing each end of a dowel by coring and removing a full depth core with approximately 3 inches of dowel bar from either end. Core test locations are determined by the Engineer. Take cores and fill core holes under section 40-1.03P.

Core after the concrete used to fill the dowel bar slots has cured at least 24 hours.

For the each test strip, you must perform 3 core tests. For the other areas, perform at least one core test per 600 dowel bars placed.

If the dowel placement is noncompliant, perform additional core tests at a frequency of at least 2 additional core tests for every 1 core test that shows noncompliance.

For test strips, if any dowels are noncompliant, correct procedures and construct and core another test strip.

For other areas, if any cores indicate that dowel bars were installed improperly, stop dowel bar retrofit activities until you demonstrate corrective action. Replace dowel bars identified as damaged or not in alignment.

41-8.02 MATERIALS

41-8.02A General

Not Used

41-8.02B Caulk

Caulk for sealing transverse joints and cracks at the bottom and sides of the dowel bar slot must be at least 50 percent silicone and designated as a concrete sealant. Caulk must comply with ASTM C834.

41-8.02C Foam Core Insert

The foam core insert must be stable in the presence of the freshly mixed concrete. Foam core insert must be either of the following:

1. Closed-cell foam faced with poster board material or plastic-faced material on each side
2. Rigid foam material

41-8.02D Dowel Bar Support Chairs

Dowel bar support chairs must comply with ASTM A884/A884M or ASTM A934/A934M for epoxy-coated steel or be fabricated from non-corroding material that is stable in the freshly mixed concrete. The chairs must firmly hold the dowel bars centered in the slots during concrete backfill operations. The chairs must be designed to hold the bar a minimum of 1/2 inch above the bottom of the slot while the concrete backfill is placed and consolidated.

41-8.02E Dowel Bar Expansion Cap

Expansion caps must:

1. Be made of commercial-quality non-corroding material that is stable in the freshly mixed concrete
2. Be tight-fitting
3. Allow a minimum of 1/4 inch of movement at each end of the bar

41-8.02F Dowel Bar Lubricant

For polyester concrete backfill, dowel bar lubricant does not need to conform to 40-1 and must prevent polyester concrete from bonding to the dowel bar without interfering with the polymerization and not damage the epoxy coating.

41-8.02G Aggregate

Aggregate for polyester concrete must comply with grading no. 3.

41-8.03 CONSTRUCTION

41-8.03A General

Place dowel bars at transverse joints and cracks in existing concrete pavement. Do not place dowel bars in transverse joints or cracks that are within 3 feet of another joint or crack. Do not place a group of 3 or 4 dowel bars if any portion of the slots would be less than 1 foot away from a longitudinal crack or a corner crack.

Only remove concrete that will be dowel bar retrofitted during the same traffic closure.

Temporary pavement structure must be 3/8-inch HMA Type A placed to the full slot depth. Place building paper against the dowel bar slot surfaces before placing temporary pavement structure.

41-8.03B Saw Cutting

Before saw cutting, survey the existing traffic striping, pavement markings, and pavement markers to determine where delineation repairs will be required. Make 2 saw cuts in the pavement to outline the longitudinal sides of each dowel bar slot. The saw cuts for the dowel bar slots must be parallel to each other and to the longitudinal joints with a maximum tolerance of 1/4 inch. Saws must have gang-mounted diamond blades to provide the specified saw-cut spacing and must be capable of making 8 saw cuts for 4 dowel bar slots or 6 saw cuts for 3 dowel bar slots simultaneously. Adjust the length of the slots at skewed joints or cracks to meet the minimum dimensions shown on the plans. Immediately remove concrete debris, water residue, and paste with a high-powered mobile vacuum that minimizes dust.

41-8.03C Remove Concrete

Remove concrete between saw cuts within 8 days of cutting dowel bar slots. Concrete removal must not damage the remaining pavement. Do not use jack hammers heavier than 38 pounds. If concrete removal damages the remaining pavement, stop concrete removal and inform the Engineer of corrective action before resuming removal activities.

After removing large concrete pieces with a jack hammer, use a small hammerhead to chip off rocks and burrs from the slot bottom. Slot bottoms must be parallel to the existing concrete surface.

41-8.03D Slot Cleaning and Preparation

Clean exposed surfaces in the dowel bar slot by sand blasting until clean aggregate is exposed. Where performing sand-blasting operations within 10 feet of a lane open to traffic, remove the residue, including dust, immediately after the sand contacts the surface being blasted. Remove the residue with a vacuum attachment operating concurrently with the sand blasting equipment.

Immediately before dowel bar installation, vacuum the dowel bar slot to remove debris, excess moisture, and residue. Immediately after vacuuming the dowel bar slot, clean the slot with compressed air free of moisture and oil. Air compressors must deliver air at a minimum of 120 cfm and develop 90 psi of nozzle pressure.

41-8.03E Seal Joints and Cracks in Slot

After cleaning the dowel bar slot, seal the existing transverse joint or crack and any other exposed cracks with caulk at the bottom and sides of the slot. Any surface receiving caulk must be clean and dry. Place caulk a minimum of 1/2 inch beyond the edges of the slot in the existing transverse joint or crack.

41-8.03F Dowel Bar Placement

Clean the surface of dowel bars before applying dowel bar lubricant. Before placement, lightly coat the entire dowel bar with dowel bar lubricant. Do not allow lubricant to drip onto the slot walls or bottom. Place dowel bars within a tolerance of 1/4 inch: to the depth shown, parallel to the longitudinal joint and the pavement surface, and centered along the slot width. Center the dowel bars at the transverse joint or

crack within a tolerance of 1 inch. Provide at least 1/2 inch clearance between the dowel bar bottom and the slot bottom.

Place a foam core insert at the middle of the dowel bar to maintain the transverse joint or crack. Remove any existing joint sealant to accommodate the foam core insert. Stabilize the foam core insert with two 1/2 by 1/2 inch tabs before placing concrete. The foam core insert must remain in a vertical position and not leak during the placement of concrete.

41-8.03G Placing Concrete

After dowel bars, expansion caps, support chairs, foam core inserts, and caulk are placed, backfill dowel bar slots with polyester concrete.

Consolidate polyester concrete with a small handheld vibrator. The vibrator must be capable of thoroughly consolidating the polyester concrete material into the slot and around the dowel bar and dowel bar support chairs. Concrete must be placed while plastic and workable.

41-8.03H Finishing Concrete

Finish the surface of the polyester concrete so the aggregate in the concrete is even with or above the surrounding concrete surface. If the aggregate settles after initial finishing you may add aggregate to achieve the required finished elevation, resin may also be added if needed. Remove excess resin.

41-8.03I Curing Concrete

Cure concrete under the manufacturer's instructions. If curing compound is recommended by the manufacturer, comply with section 90-1.03B for curing compound no. 1 or 2.

41-8.03J Opening to Traffic

Before opening to traffic the slots must be filled.

Before opening to traffic polyester concrete must be in place at least 4 hours.

You may request an earlier opening age. Submit certified laboratory test results of compressive strength under California test 551 or ASTM C 109 conducted at material and ambient temperatures no more than 68 degrees F. Traffic may be allowed on the retrofit joints according to the following table:

Time to reach 1250 psi (h:mm)	Earliest Opening Age Allowed (h:mm)
1:10 to 1:29	2:15
1:30 to 1:49	2:30
1:50 to 2:09	2:45
2:10 to 2:29	3:00
2:30 to 2:49	3:15
2:50 to 3:09	3:30
3:10 to 3:29	3:45
3:30 or more	4:00

Determine the initial set time for polyester concrete under ASTM C 266. Add 2 minutes to the opening time for each 1 minute the initial set time exceeds 30 minutes

41-8.03K Grind Pavement

Grind concrete pavement lanes with dowel bar retrofit under section 42. If sealing joints, grind before sawing and sealing the joints.

Grind within 30 days from the initial saw cutting for the dowel bar slots and at least 12 hours after placing concrete.

41-8.03L Pavement Replacement

Instead of dowel bar retrofit, you may replace existing concrete pavement. The new concrete pavement must be the same thickness as the removed pavement. Replace between longitudinal joints or pavement edges and between transverse joints. Do not remove portions of slabs.

Replacement of concrete pavement must comply with individual slab replacement under section 41-11.

Where you replace slabs, install dowels by drill and bond under section 41-10 or dowel bar baskets under section 40-1.03F.

For replacement concrete pavement, you may stir pigmented curing compound manually during application. You may apply curing compound with hand-held spraying equipment and the nozzle may be unshielded.

Do not disturb adjacent concrete pavement and subgrade during concrete pavement removal and replacement. Recompact disturbed subgrade to 95 percent relative compaction at your expense.

41-8.03M Coring

Immediately after coring, identify each concrete core with a location description and submit to the Engineer. Do not damage the concrete adjacent to core holes.

Water from core drilling operations must not be exposed to traffic or flow into gutters, drainage facilities, shoulders, or lanes.

After core removal, clean core holes and fill with the same type of concrete used to fill the slots. Trowel the plastic concrete to match the pavement surface.

If any cores indicate that dowel bars were installed improperly, stop dowel bar retrofit activities until you demonstrate corrective action. Replace dowel bars identified as damaged or not in alignment.

41-8.03N Repair Pavement Delineation

Repair pavement delineation removed or damaged by dowel bar retrofit under section 84 and section 85.

41-8.04 PAYMENT

Not used

41-9 INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE

41-9.01 GENERAL

41-9.01A Summary

Section 41-9 includes specifications for constructing individual slab replacement with rapid strength concrete (ISR—RSC) under pavement overlays or as temporary repairs for locations that will replaced under this contract.

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 strength specified for opening to traffic and equipment is attained.

time of final setting: Length of time elapsed to develop penetration resistance of 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. One hour before opening age
    - 10.2. Opening age
    - 10.3. One hour after opening age
    - 10.4. One day
    - 10.5 Three days
    - 10.6. Seven days
    - 10.7. Twenty-eight days
11. Any special instructions or conditions such as water temperature requirements

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 submittal. 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) 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 including:
   - 4.1. Action limits
   - 4.2. Suspension limits that do not exceed specified material properties
   - 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:
   - 7.1. Locations and times

7.2. Production procedures
7.3. Placing and finishing methods
7.4. Sampling methods, sample curing, and sample transportation
7.5. Testing and test result reporting

9. Name of source plant with approved Material Plant Quality Program (MPQP)

10. Proceedures or methods for controling pavement quality including:

10.1. Materials quality
10.2. Contraction and construction joints
10.3. Protecting pavement before opening to traffic

41-9.01D(3) Prepaving Conference

Schedule a prepaving conference at a mutually agreed time and place to meet with the Engineer. Make the arrangements for the conference facility.

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

Do not start trial slabs or paving activities until the listed personnel have attended a preconstruction conference.

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

41-9.01D(4) Trial Slabs

Before starting individual slab replacement work, complete 1 trial slab for each mix design and obtain authorization..

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(5) Quality Control Testing

41-9.01D(5)(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. Record QC, sampling, and testing on the report forms and submit as specified.

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(5)(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 [a]
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[b]	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
Moisture[c]	California Test 223 or 226	1 per shift

[a]Test at the most frequent interval.
[b]Testing only required in freeze-thaw areas.
[c]Check calibration by comparing moisture meter reading with California Test 223 or 226 test result.

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 ±1.0 percent and the suspension limit is ±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 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.

41-9.01D(6) Acceptance Criteria

41-9.01D(6)(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

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.

41-9.01D(6)(b) Modulus of Rupture

ISR—RSC is accepted based on:

1. Your testing for modulus of rupture at opening age. The ISR—RSC must have a modulus of rupture of at least 400 psi
2. The Department’s testing for modulus of rupture at 3 days. ISR—RSC must have a modulus of rupture at 3 days of 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(6)(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(6)(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:

1. Partial or full-depth cracking
2. Concrete raveling consisting of either:
   - 2.1. Combined raveled areas more than 5 percent of the total slab area
   - 2.2. Single raveled area of more than 4 sq ft

41-9.02 MATERIALS

41-9.02A General

Not Used

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 Bond Breaker

Bond breaker must be one of the following:

1. White opaque polyethylene film under ASTM C 171 except the minimum thickness must be 6 mils.
2. White curing paper under ASTM C 171.
3. Geosynthetic bond breaker.

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 15-3. 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 Bond Breaker

41-9.03D(1) General

Place bond breaker before placing ISR—RSC

Before placing bond breaker, remove foreign and loose materials from the base.

Do not place bond breaker until the base has cured. Protect bond breaker from damage during placement of RSC.

Bond breaker must be covered with pavement within 72 hours.

41-9.03D(2) Placing Bond Breaker

Polyethylene film and curing paper must not be wrinkled. Overlap adjacent sheets a minimum of 6 inches and in the same direction as the concrete pour. Tape or bond the sheets together as needed to prevent sheets from folding or wrinkling. Secure the bond breaker sufficiently so that it remains in place during concrete pavement placement. Ensure that no concrete gets under the bond breaker.

Geosynthetic bond breaker must not be wrinkled. Overlap adjacent sheets a minimum of 8 inches in the same direction as the concrete pour. Overlap no more than three layers at any location. Secure bond breaker to the base with pins or nails punched through galvanized washers or discs 2–2.75-inches in diameter spaced less than 6 ft apart in each direction except along edges spacing must be less than 3 ft. If

bond breaker moves or wrinkles while placing concrete pavement increase the frequency of fasteners. Ensure that no concrete gets under the bond breaker.

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.

41-9.03G 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. 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 3/32–1/8 inch wide; on 3/4-inch centers; and have enough length, thickness, and resilience to form grooves 1/8–3/16 inch deep after the concrete has hardened. Grooves must extend over the entire pavement width except do not construct grooves 3 inches from the concrete pavement edges nor longitudinal 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.

41-9.03H Temporary Pavement Structure

Temporary pavement structure must be RSC or minimum 3-1/2 inch thick HMA over aggregate base.

41-9.03I 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 and retesting. Grinding that causes a depression will not be considered.
4. Noncompliant modulus of rupture value

If the modulus of rupture is at least 400 psi at opening age, and the modulus of rupture is at least 500 psi but less than 600 psi at 3-days, you may request authorization to leave the slabs in place and accept a deduction as specified.

If pavement noncompliant for coefficient of friction, groove or grind the pavement under section 42. Comply with section 40-1.03Q(4) and perform grooving or grinding before the installation of any required joint seal or edge drains adjacent to the areas to be grooved or ground.

If an ISR—RSC slab has partial depth cracking, treat it with high molecular weight methacrylate under section 41-3.

41-9.03J Replace Pavement Delineation

Replace traffic stripes, pavement markings, and markers that are removed, obliterated, or damaged by ISR—RSC under sections 84 and 85.

41-9.04 PAYMENT

For ISR—RSC with an opening age of 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 payment deduction is 10 percent.

For ISR—RSC with an opening age of at least 400 psi, a modulus of rupture at 3 days greater than or equal to 550 psi but less than 600 psi, the payment deduction is 5 percent.

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

Not Used

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.

41-10.02 MATERIALS

41-10.02A General

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

41-10.03 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 or 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:

Tie Bar Tolerances

Dimension	Tolerance
Horizontal skew	1:6 (horizontal skew: bar length)
Vertical skew	1:6 (vertical skew: bar length)
Longitudinal translation	± 1 inch
Horizontal offset (embedment)	± 1 inch
Height relative to the adjacent bar	± 1 inch
Vertical Depth	Not less than 3 inches clearance from the pavement surface or bottom

41-10.03C Dowel Bar Tolerance

Place dowel bars within the tolerances specified in section 40-1.01D(7)(b)(iv).

41-10.04 PAYMENT

Not Used

41-11 INDIVIDUAL SLAB REPLACEMENT (PRECAST CONCRETE PANELS)

41-11.01 GENERAL

41-11.01A Summary

Section 41-7 includes specifications for furnishing and installing precast concrete panels (PCP) for individual slab replacement (ISR). Furnishing includes any pretensioning of individual pavement panels before casting.

Before submitting shop drawings, field verify the profile and grade information described,

Use dowel bars at connections between ISR(PCP) and the existing concrete. Comply with section 41-8 "Dowel Bar Retrofit" or 41-10 "Drill and Bond Bars".

Comply with Section 40-1 except where specified.

Comply with Section 50 except where specified for prestressing.

41-11.01B Definitions

system: consists of features that are part of design, construction, and performance of the precast pavement product. These features are included, but are not limited to size and thickness of panels and slabs, joints, elements cast in the panels, load transfer method, techniques for providing grade control for the panels, etc.

41-11.01C Submittals

41-11.01C(1) General

Section 40-1.01C does not apply to ISR(PCP).

Section 50-1.01C(3) does not apply to ISR(PCP).

Submit ISR(PCP) shop drawings to the Engineer and to Office of Concrete Pavement and Pavement Foundation, MS # 5, 5900 Folsom Boulevard, Sacramento, CA 95819. Submit 4 sets to the Engineer and 1 set to the Office of Concrete Pavement and Pavement Foundation. Allow 3 weeks for review.

Shop drawings must include:

1. Details for furnishing PCP including:
    1.1. The QCP under section 11-2
    1.2. Panel layout and coordinating panel identification system
    1.3. Panel material
    1.4. Complete details and substantiating calculations of the method and materials proposed for use in the pretensioned activities, including the addition or rearrangement of reinforcing steel
    1.5. Your adjusted panel dimensions including calculations for:
        1.5.1 Allowable fabrication tolerances
        1.5.2. Allowable installation tolerances
    1.6. Method for casting connection elements within the specified alignment for final placement
    1.7. Grout vent locations on the details shown
    1.8. Finishing methods and procedures
    1.9. Methods and procedures for handling and transport
2. Details, methods and procedures for installing PCP panels including:
    2.1. Methods and procedures for handling panels
    2.2. Methods and procedures for supporting and adjusting grade of the PCP during installation
    2.3. Methods and procedures for installing joint filler, joints, and joint seals
    2.4. Details and methods for connecting to the existing pavement
3. Detail method for repairing damaged during removal from the forms or transport and installation

The shop drawings must comply with Section 50-1.02, “Drawings”, of the Standard Specifications except (1) the 3rd and 6th paragraphs do not apply, and (2) do not send it to the Office of Structural Materials. Submit 1 set of shop drawings to the Office of Concrete Pavement and Pavement Foundation.

41-11.01C(2) Alternative Design

In lieu of the design shown on the project plans, you may propose an alternative design which has different panel dimensions within the limits specified in this specification, is conventionally reinforced or pretensioned in two directions, and has a different arrangement for load transfer using dowel bars.

For alternate design, the thickness of panels must not be less than the existing pavement thickness. The maximum width or length must not exceed 36 feet. Panels may be pretensioned or reinforced; however, pretensioning in one or two directions is required for any alternate panel design with length or width greater than 15 feet.

If an alternative design is proposed, it must be submitted in writing to the Engineer. The Engineer has 4 weeks to review and evaluate the alternate design after a complete plan has been received. The Engineer approves shop drawings for the alternate design based on requirements under Submittals. Do not perform precasting until the alternate design is approved by the Engineer.

In addition to the above information listed for shop drawings, the alternate design submittal must include:

1. Location and position of threaded lifting inserts and grout capping methods.
2. A rearrangement of pretensioning and/or reinforcing steel. Bar reinforcement details are to be at least equivalent to the Department’s design.
3. Location of underslab grout vents.
4. Panel connection and joint sealant details.
5. Dowel bar slot and installation details at all transverse construction joints.
6. Manufacturer’s installation instructions.

Any new idea or process proposed for use as part of the alternative design which is approved and allowed on the job will become property of the Department and no patent can be filed for that idea or process.

41-11.01C(3) System Approval

Final approval and use on the project will be given once the Trial Panels have been successfully completed and the fabrication and installation details have been completed to the satisfaction of the Engineer.

For alternate system approval, the process consists of two parts. In Part 1, the system designer shall prepare and submit specification, fabrication drawings, and installation procedures. Part 2 of the approval process will consist of construction and evaluation of a trial installation. Final approval and use as an approved system will be given once the specification, fabrication drawings and installation procedures have been completed, the trial panels have been installed in accordance with the approved process and the Department has determined the trial installation is successful.

41-11.01D Quality Control and Assurance

41-11.01D(1) General

Section 40-1.01D does not apply.

Hold the prepaving conference after submitting the shop drawings, and 2 weeks before beginning installation activities. Discuss methods of performing the installation work including:

1. An outline procedure for transportation of PCP.
2. An outline procedure for installation and testing of PCP including trial panels.
3. A contingency plan for correcting problems in transportation and installation of PCP. Include the quantity and location of standby material in your contingency plan.
4. A contingency plan for correcting problems with existing base
5. Provisions for determining if ISR(PCP) must be suspended and temporary roadway pavement structure constructed.

At the minimum, the meeting must be attended by your:

1. Project superintendent
2. Quality control manager
3. Installation construction foreman
4. Subcontractor's workers including:
   - 4.1. Fabricator’s project manager
   - 4.2. Personnel responsible for saw cutting, epoxy application, post-tensioning, fill access pockets, duct grouting, underslab grouting and joint sealing

41-11.01D(2) Quality Control Testing

Construct pavement trial panels and obtain authorization of your trial panels before starting other paving work. Trial panels must comply with the authorized shop drawings and:

1. Be at a mutually-agreed location that is on the roadway within the project limits
2. Installed under similar traffic conditions and with the same equipment to be used for the planned installation, and under similar atmospheric and temperature conditions expected during replacement operations.
3. Be at least 12' wide and 8' long
4. Complete two adjacent trial panels for each proposed panel design (e.g. pretensioned or reinforced)
5. Thickness must match existing concrete slab thickness and be at least 0.7 feet
6. he adjacent trial panel installation shall include location with highest transition rate, if the project includes locations with superelevation transition

Notify the Engineer at least 25 working days before you start trial panel installation.

Allow 3 days for trial panel review.

Construct additional trial panels if you change:

1. Methods and equipment including:
   1.1. Fabrication plants
   1.2. Panel lifting, shipment, and delivery methods
   1.3. Grouting equipment
   1.4. Connections to the existing pavement
2. Grout mix for under the slab
3. Base material preparation methods

If you have successfully installed ISR(PCP) on a previous Department project and used the same fabrication plant, installation equipment and procedures, and personnel, you may request authorization to start precasting without a trial panel installation. Your request must include supporting documentation from the previous Department project.

41-11.01D(3) Pavement Acceptance

41-11.01D(3)(a) General

Construct PCP to the dimensions shown on the authorized shop drawings. PCP is rejected if the fabricated dimensions are not within the tolerances shown in the following table:

PCP Fabrication

Dimension	Tolerances
Length (longer dimension)	+/- 1/4 inch
Width (shorter dimension)	+/- 1/4 inch
Nominal thickness	+/- 1/8 inch
Edge alignment straightness measured from a horizontal plane	+/- 1/8 inch
Skew at the ends	+/- 1/8 inch
Batter	+/- 1/8 inch
Position of pretensioning strands	+/- 1/4 inch, vertical[a]
	+/- 1/4 inch, horizontal
Diagonal difference of the corner to corner measurement	+/- 1/4 inch
Position of lifting anchors	+/- 3 inches

[a]Measured from the bottom of the panel

The profile and grade of the finished PCP must match the existing pavement including any superelevation and superelevation transition. PCP is rejected if the installed alignments are not within the tolerances shown in the following table:

PCP Installation

Alignment	Tolerances
Vertical at transverse joints	+/- 1/4 inch
Vertical at longitudinal joints	+/- 1/4 inch
Horizontal at transverse joints	+/- 1/4 inch
Horizontal at longitudinal joints	+/- 1/4 inch

PCP is rejected if:

1. There are voids more the 1 inch between base and bottom of panel
2. Joint width exceeds 1 1/2 inch

3. Surface varies more than 0.02 foot from a 12-foot straightedge's lower edge
4. Wheel path's individual high points are greater than 0.025 foot in 25 feet
5. Final finishing does not comply with the specifications except coefficient of friction

41-11.01D(3)(b) Trial Panels

If the trial panels comply with the acceptance criteria except for the coefficient of friction, you may grind the trial panels under section 42. If the trial panels comply with the acceptance criteria after grinding, you may request to leave the trial panels in place.

If the trial panels do not comply with the panel alignment criteria, the trial panels are rejected. Submit revised shop drawings that include your proposed changes to correct the alignment. After the revised submittals are authorized, install new trial panels. Repeat this process until the trial panels comply with the acceptance criteria.

Remove and dispose of rejected trial panels.

41-11.01D(4) Testing for Coefficient of Thermal Expansion

If the average coefficient of thermal expansion for each lot exceeds 5.5 microstrain/degree Fahrenheit or a single test result exceeds 6.2 microstrain/degree Fahrenheit during field qualification, you may do one of the following:

1. Reduce maximum transverse joint spacing to 12.5 feet.
2. Modify batch process for mixing concrete to reduce coefficient of thermal expansion.
3. Obtain new source of aggregate and perform new mix design and field qualification.

If the average coefficient of thermal expansion exceeds 7.0 microstrain/degree Fahrenheit, obtain new aggregate source.

During production, if 2 consecutive tests exceed 6.2 microstrain/degree Fahrenheit without reducing maximum transverse joint spacing and/or one test exceeds 7.0 microstrain/degree Fahrenheit, stop operation and perform a new field qualification.

41-11.02 MATERIALS

41-11.02A General

Bond breaker must be white polyethylene sheeting and at least 6-mils thick. Sheeting must comply with ASTM C 171.

Grout for underslab grouting, must comply with Section 50-1.09, “Bonding and Grouting” of the Standard Specifications.

Polyester concrete must comply with section 41-1.

41-11.02B Prestressing

Prestressing must comply with section 50-1.02.

Transverse pretensioning strand must be 0.5 or 0.6 inch diameter, conforming to ASTM Designation: A 416, Grade 270 (low relaxation).

41-11.02C Joint Seal

Joint seal for transverse and longitudinal joints must comply with section 41-5 “Joint Sealing”. Use preformed compression seals.

41-11.03 CONSTRUCTION

41-11.03A General

Prestressing must comply with section 50-1.03. The specifications for a "member" applies to a PCP.

If installation of the ISR(PCP) is not completed during the same lane closure, you must comply with the specifications for temporary roadway pavement structure under section 41-1. Temporary pavement structure must be RSC or minimum 3-1/2 inch thick HMA over aggregate base.

41-11.03B Removing Existing Pavement

Remove pavement under section 15-3. The Engineer determines the exact ISR(PCP) 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.

41-11.03C Furnishing PCP

If the roadway alignment is on a curve with a radius of under 2, 500 feet, place the reinforcement along a single plane. If the curve does not allow the spacing shown between transverse bar reinforcement and prestress, space them a distance that is between one half the specified spacing and the specified spacing. Before casting, grease the section of dowels extending into the expansion sleeve.

Lifting devises must be recessed at least 1/2 inch below the panel surface and a distance of at least 0.2L from any panel edge.

After casting and before curing, comply with section 40-1.03M.

Section 40-1.03N does not apply. Cure PCP under section 90-4.

Section 40-1.03O does not apply.

PCP must have a minimum compressive strength of 4,000 psi prior to the time of releasing the pretensioning strands. Before shipping, PCP must have a minimum compressive strength of 6,000 psi and must have cured for at least 14 days.

41-11.03D Installing PCP

41-11.03D(1) General

The existing concrete pavement at transverse or longitudinal joints may be saw cut to a maximum of 3 inches from the joint in order to provide a straight edge for a uniform conform.

Before installing PCP, clean and dry the surface of the base and place the bond breaker on it. The bond breaker must be free of wrinkles and overlapped at least 6 inches in the same direction as the panel installation.

41-11.03D(2) Backfilling

Fill dowel bar slots in the PCP and existing concrete pavement as soon as possible after panel placement and prior to opening to traffic. Fill dowel bar slots with polyester concrete in accordance with Section 41-8 of these special provisions.

If you are not able to fill dowel bar slots prior to opening to traffic, cover the slots with temporary covers that withstand traffic loading. The temporary covers must be fastened to panels so that they are not disturbed by traffic and must be flush with the surface of the pavement. Do not leave temporary covers at any given location for more than 48 hours.

Backfill voids or recessions in the panels related to lifting anchors polyester concrete.

41-11.03D(3) Grouting

Complete underslab grouting within 3 days of panel placement. Grouting must comply with the specifications for in section 41-2, except do not drill holes. Underslab grouting must occur prior to opening to traffic, if there are voids of 1/2 inch or greater beneath panels during placement.

41-11.03D(4) Final Finishing

If the Engineer determines by visual inspection the final texturing may not comply with the specifications for coefficient of friction, the Engineer tests to determine coefficient of friction. Open the pavement to traffic and allow 5 days after concrete placement for the Department to test for coefficient of friction. If pavement does not comply with the specifications for coefficient of friction, groove or grind the pavement under Section 42, "Groove and Grind Pavement," of the Standard Specifications.

The Engineer tests for smoothness using a 12-foot straightedge placed parallel with and perpendicular to the centerline. Straightedge smoothness specifications do not apply to the pavement surface placed within 12 inches of existing concrete pavement except you must place a straightedge longitudinally with the midpoint coincident with the transverse construction joint. The concrete pavement surface must be within 0.02 foot of the straightedge's lower edge. Correct pavement at contact joints not in compliance with straightedge smoothness specifications within 48 hours of performing test by grinding.

41-11.03D(5) Joints

If joints are wider than 1/4 inch seal the joints. Install joint filler before grinding. Seal joints after grinding is completed in compliance with section 41-5.

For joints wider than 3/4 inch, reconstruct the joint by backfilling with polyester concrete or product authorized by the Engineer and saw cutting.

Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under Section 28-1.07, "Curing," of the Standard Specifications.

41-11.03E Panel Repair

Repair spalls in panels damaged from fabrication, handling, and installation in compliance with section 41-4, except polyester concrete must be used. Repairs are required when any surface of the panel or panel edges are damaged and will affect ride quality, assembly of the panels, or long-term performance of the pavement. Repairs to panel edges and panel surface must not protrude above the surface.

Panels with spalls which exceed the dimensions in section 40-1.03Q(2), have full depth cracks, or working cracks, shall be removed and replaced with new panels.

Treat the cracks that do not extend to the full depth of a panel with a high molecular weight methacrylate resin in compliance with section 41--3” Crack Treatment".

41-11.04 PAYMENT

If the Engineer accepts trial panels for use as roadway, the trial panels are paid for as ISR(PCP).

Repair or replacement of damaged panels or existing concrete damaged from ISR(PCP) operations, shall be at your expense.

10. GEOSYTHETIC BOND BRAKER

Replace section 88-1.02Q with:

04-19-13

88-1.02Q Geosynthetic Bond Breaker

Geosynthetic bond breaker must be nonwoven; needle punched; not heat treated; polypropylene, polyethylene material.

When tested under the referenced test methods, properties of geosynthetic bond breaker material must have the values shown in the following table:

Geosynthetic Bond Breaker

Property	Test	Value
Mass per unit area, oz/sq yd min	ASTM D 5261	14.7
Thickness at 29 psi, mm min	ASTM D 5199	1.0
Tensile strength at ultimate, lbs/ft min	ASTM D 4595	685
Elongation ,percent max	ASTM D 4595	130
Permittivity at 2.9 psi, m/s min	ASTM D 5493	0.0001
Hydraulic transmissivity at 29 psi, m/s min	ASTM D 6574	0.0002
Ultraviolet resistance, percent min retained grab breaking load, 500 hours	ASTM D 4355	60

11. ROLLER COMPACTED CONCRETE

Add to section 90:

90-6 ROLLER COMPACTED CONCRETE

90-6.01 GENERAL

90-6.01A Summary

Section 90-6 includes specifications for furnishing and curing roller compacted concrete (RCC.)

90-6.01B Definitions

Not Used

90-6.01C Submittals

Not Used

90-6.01D Quality Control and Assurance

90-6.01D(1) General

Fabricate compressive strength test specimens under ASTM C 1435.

Paragraph 2 of section 90-1.01D(2) does not apply to RCC.

Prequalify RCC under section 90-1.01D(5)(b).

90-6.01D(2) Shrinkage

Perform shrinkage tests on samples that have been cut from compacted RCC. Remove specimens from the in-place compacted RCC between 24 hours and 48 hours age. Store specimens in a water bath. At least 24 hours before the initial reading trim specimens to a 4 inch by 4 inch cross section and the required length for a 10 inch gage length.

90-6.01D(3) Compressive Strength

The fifth paragraph of section 90-1.01D(5)(a) does nota apply to roller compacted concrete. If the compressive strength is 5000 psi or more, 42 days are allowed to attain the specified strength.

90-6.02 MATERIALS

90-6.02A General

If the minimum cementitious material content specified is less than 425 lb/cu yd, replace Equation 2 in 90-1.02(B)3 with:

$$(425 - MSCM - PC) \geq 0$$

90-6.02B Aggregate Gradings

90-6.02B(1) General

Section 90-1.02C(4) does not apply to RCC.

Furnish aggregate divided into two or more sizes. The grading of each of the sizes is at your discretion. Control the gradation of each size with a minimum of 4 sieves. Maintain the gradation on each sieve within 10 percentage points of your target for each sieve.

90-6.02B(2) Combined Aggregate Grading

Combined aggregate must be graded within the limits shown in the following table:

Sieve size	Percentage passing				
	1/2 inch max	3/4 inch max	1 inch max	1-1/2 inch max	2 inch max
2-1/2 inch	--	--	--	--	100
2 inch	--	--	--	100	90–100
1-1/2 inch	--	--	100	87–100	78–97
1 inch	--	100	82–100	71–91	--
3/4 inch	100	87–100	72–91	--	56–76
1/2 inch	81–100	71–91	--	50–71	--
3/8 inch	71–91	--	50–71	--	39–59
No. 4	49–70	42–63	--	30–49	27–46
No. 8	33–54	--	23–42	--	--
No. 16	--	18–36	--	13–28	--
No. 30	12–28	--	8–22	--	6–18
No. 50	--	5–19	--	3–15	--
No. 100	3–16	1–13	1–12	1–11	1–10
No. 200	0–10	0–9	0–8	0–7	0–7

90-6.03 CONSTRUCTION

90-6.03A General

Not Used

90-6.03B Mixing and Transporting RCC

90-6.03B(1) General

Mix and transport concrete under 90-1.02G. You may use batch mixing or horizontal shaft mixing. Section 90-1.02G(5) and 90-1.02G(6) do not apply.

Protect concrete hauled in open-top vehicles from rain or evaporation with retractable covers.

Discharge RCC material within 45 minutes after the addition of the cement to the aggregates. Deposit the RCC material directly into the hopper of the paver or into a secondary material distribution system that deposits the material into the paver hopper.

90-6.03B(2) Horizontal Shaft Mixing

A horizontal shaft mixing plant must be a central plant type with a twin-shaft mixer, capable of either batch or continuous mixing, equipped with synchronized metering devices and feeders to maintain the correct proportions of aggregate, cement, SCM, and water. Plants must utilize:

1. Controlled aggregate feed rate. Use aggregate bins with a feed rate controlled by a variable speed belt, or an operable gate calibrated to accurately deliver any specified quantity of material. The feed rate from each aggregate bin must be readily adjustable to change aggregate proportions. Feed rate controls must maintain the established proportions of aggregate from each stockpile bin when the combined aggregate delivery is increased or decreased.
2. Plant scales. Plant scales must conform to Section 90-1.02F(3), “Proportioning Devices.”
3. Cement and SCM storage. Supply separate and independent storage silos for cement and SCM. Each silo must have a sign at each fill inlet clearly identifying the material that is in the silo that is easily read even when completely coated with dust. Make the sign from a durable material, with minimum two-inch high by ¼-inch wide letters that are raised, indented, or cut.

4. Preblended portland cement and SCM. If you preblend portland cement and SCM at the batch plant, demonstrate, with a testing plan, the ability to successfully produce a uniform blended material meeting the mix design requirements. Perform testing on at least a daily basis to ensure both uniformity and proper quantities.
5. Cement and SCM feed unit. Provide a satisfactory means of dispensing portland cement and SCM, volumetrically or by weight, to ensure a uniform and accurate quantity of cementitious material enters the mixer.
6. Water control unit. Use a water control unit capable of measuring the required amount of water for the approved mix by weight or volume. Ensure that the unit is equipped with an accurate metering device. Vary the amount of water to be used only with the Engineer's approval.
6. Gob hopper. For continuous operating mixers, provide a gob hopper attached to the end of the final discharge belt to temporarily hold the roller compacted concrete material in order to allow the plant to operate continuously.

90-6.04 PAYMENT

Not Used