**** WARNING ** WARNING ** WARNING ** WARNING ****
**This document is intended for informational purposes only.**

Users are cautioned that California Department of Transportation (Department) does not assume any liability or responsibility based on these electronic files or for any defective or incomplete copying, exerpting, scanning, faxing or downloading of the contract documents. As always, for the official paper versions of the bidders packages and non-bidder packages, including addenda write to the California Department of Transportation, Plans and Bid Documents, Room 0200, P.O. Box 942874, Sacramento, CA 94272-0001, telephone (916) 654-4490 or fax (916) 654-7028. Office hours are 7:30 a.m. to 4:15 p.m. When ordering bidder or non-bidder packages it is important that you include a telephone number and fax number, P.O. Box and street address so that you can receive addenda.

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

---

# NOTICE TO CONTRACTORS

# AND

# SPECIAL PROVISIONS

## FOR CONSTRUCTION ON STATE HIGHWAY IN

**LOS ANGELES COUNTY IN LOS ANGELES, GLENDALE AND BURBANK**

**FROM THE 5/10/60/101 SEPARATION TO PROVIDENCIA AVENUE OVERHEAD**

**DISTRICT 07, ROUTE 5**

---

**For Use in Connection with Standard Specifications Dated JULY 1999, Standard Plans Dated JULY 2004, and Labor Surcharge and Equipment Rental Rates.**

---

**CONTRACT NO. 07-193104**

**07-LA-5-27.2/46.4**

**Federal Aid Project**

**ACIM-005-3(064)E**

**Bids Open: September 29, 2005**
**Dated: August 1, 2005**

**OSD**

# TABLE OF CONTENTS

NOTICE TO CONTRACTORS ..... 1
COPY OF ENGINEER'S ESTIMATE ..... 3
SPECIAL PROVISIONS ..... 6
SECTION 1. SPECIFICATIONS AND PLANS ..... 6
AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS ..... 6
SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS ..... 71
2-1.01 GENERAL ..... 71
2-1.015 FEDERAL LOBBYING RESTRICTIONS ..... 71
2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE) ..... 72
2-1.02A DBE GOAL FOR THIS PROJECT ..... 73
2-1.02B SUBMISSION OF DBE INFORMATION ..... 74
SECTION 3. AWARD AND EXECUTION OF CONTRACT ..... 75
SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES ..... 76
SECTION 5. GENERAL ..... 76
SECTION 5-1. MISCELLANEOUS ..... 76
5-1.01 PLANS AND WORKING DRAWINGS ..... 76
5-1.011 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK ..... 76
5-1.012 DIFFERING SITE CONDITIONS ..... 76
5-1.013 LINES AND GRADES ..... 77
5-1.015 LABORATORY ..... 77
5-1.017 CONTRACT BONDS ..... 77
5-1.019 COST REDUCTION INCENTIVE ..... 77
5-1.02 LABOR NONDISCRIMINATION ..... 77
5-1.022 EXCLUSION OF RETENTION ..... 77
5-1.023 UNSATISFACTORY PROGRESS ..... 78
5-1.03 INTEREST ON PAYMENTS ..... 78
5-1.04 PUBLIC SAFETY ..... 78
5-1.05 TESTING ..... 79
5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES ..... 79
5-1.07 (BLANK) ..... 80
5-1.075 BUY AMERICA REQUIREMENTS ..... 80
5-1.08 SUBCONTRACTOR AND DBE RECORDS ..... 80
5-1.083 DBE CERTIFICATION STATUS ..... 80
5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS ..... 81
5-1.09 SUBCONTRACTING ..... 81
5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS ..... 82
5-1.103 RECORDS ..... 82
5-1.11 PARTNERING ..... 82
5-1.114 VALUE ANALYSIS ..... 83
5-1.12 DISPUTE REVIEW BOARD ..... 83
5-1.13 FORCE ACCOUNT PAYMENT ..... 93
5-1.14 AREAS FOR CONTRACTOR'S USE ..... 94
5-1.15 PAYMENTS ..... 94
5-1.16 PROJECT INFORMATION ..... 94
5-1.17 SOUND CONTROL REQUIREMENTS ..... 95
5-1.18 INTERNET DAILY EXTRA WORK REPORT ..... 95
SECTION 6. (BLANK) ..... 95
SECTION 7. (BLANK) ..... 95
SECTION 8. MATERIALS ..... 96
SECTION 8-1. MISCELLANEOUS ..... 96
8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS ..... 96
8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS ..... 102
8-1.03 SLAG AGGREGATE ..... 108
SECTION 8-2. CONCRETE ..... 109

8-2.01 PORTLAND CEMENT CONCRETE ..... 109
SECTION 8-3. WELDING ..... 110
8-3.01 WELDING ..... 110
GENERAL ..... 110
WELDING QUALITY CONTROL ..... 112
PAYMENT ..... 114
SECTION 9. DESCRIPTION OF BRIDGE WORK ..... 114
SECTION 10. CONSTRUCTION DETAILS ..... 114
SECTION 10-1. GENERAL ..... 114
10-1.01 CONSTRUCTION PROJECT INFORMATION SIGNS ..... 114
10-1.02 ORDER OF WORK ..... 115
10-1.03 MATERIAL CONTAINING AERIALLY DEPOSITED LEAD ..... 116
LEAD COMPLIANCE PLAN ..... 116
SOIL HANDLING ..... 116
10-1.04 WATER POLLUTION CONTROL ..... 116
RETENTION OF FUNDS ..... 117
WATER POLLUTION CONTROL PROGRAM PREPARATION, APPROVAL AND AMENDMENTS ..... 118
COST BREAK-DOWN ..... 119
WPCP IMPLEMENTATION ..... 122
MAINTENANCE ..... 123
REPORTING REQUIREMENTS ..... 123
PAYMENT ..... 123
10-1.05 COOPERATION ..... 124
10-1.06 SOLID WASTE DISPOSAL AND RECYCLING REPORT ..... 124
10-1.07 PROGRESS SCHEDULE (CRITICAL PATH METHOD) ..... 124
DEFINITIONS ..... 124
GENERAL REQUIREMENTS ..... 125
COMPUTER SOFTWARE ..... 126
NETWORK DIAGRAMS, REPORTS AND DATA ..... 127
PRE-CONSTRUCTION SCHEDULING CONFERENCE ..... 128
BASELINE SCHEDULE ..... 128
UPDATE SCHEDULE ..... 128
TIME IMPACT ANALYSIS ..... 129
FINAL UPDATE SCHEDULE ..... 129
RETENTION ..... 129
PAYMENT ..... 129
10-1.08 TIME-RELATED OVERHEAD ..... 130
10-1.09 OBSTRUCTIONS ..... 132
10-1.10 DUST CONTROL ..... 133
10-1.11 MOBILIZATION ..... 133
10-1.12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES ..... 133
10-1.13 CONSTRUCTION AREA SIGNS ..... 134
10-1.14 MAINTAINING TRAFFIC ..... 134
10-1.15 CLOSURE REQUIREMENTS AND CONDITIONS ..... 210
CLOSURE SCHEDULE ..... 210
CONTINGENCY PLAN ..... 210
LATE REOPENING OF CLOSURES ..... 210
COMPENSATION ..... 210
10-1.16 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE ..... 210
STATIONARY LANE CLOSURE ..... 211
MOVING LANE CLOSURE ..... 211
PAYMENT ..... 212
10-1.17 TEMPORARY PAVEMENT DELINEATION ..... 212
GENERAL ..... 212
TEMPORARY LANELINE DELINEATION ..... 212
TEMPORARY EDGELINE DELINEATION ..... 213
10-1.18 BARRICADE ..... 213
10-1.19 PORTABLE CHANGEABLE MESSAGE SIGN ..... 213
10-1.20 TRAFFIC PLASTIC DRUMS ..... 214

10-1.21 TEMPORARY CRASH CUSHION MODULE ....214
10-1.22 EXISTING HIGHWAY FACILITIES ....215
REMOVE METAL BEAM GUARD RAILING ....215
REMOVE PAVEMENT MARKER ....215
REMOVE ASPHALT CONCRETE DIKE ....216
COLD PLANE ASPHALT CONCRETE PAVEMENT ....216
EXISTING LOOP DETECTORS ....216
10-1.23 ASPHALT CONCRETE ....217
10-1.24 REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE) ....217
DEFINITIONS ....218
PRE-OPERATION CONFERENCE ....218
JUST-IN-TIME TRAINING ....218
REMOVING EXISTING PAVEMENT AND BASE MATERIALS ....218
TEMPORARY ROADWAY STRUCTURAL SECTION ....219
RAPID STRENGTH CONCRETE ....219
CORE DRILLING FOR DOWEL BAR AND PLACEMENT ALIGNMENT ASSURANCE TESTING ....226
PREFORMED COMPRESSION JOINT SEAL INSTALLATION ....227
CONSTRUCTING LONGITUDINAL ISOLATION JOINTS ....228
CONSTRUCTING TRANSVERSE JOINT CONNECTIONS AND ANCHORS ....228
PROFILE INDEX ....228
CONSTRUCTING WEAKENED PLANE JOINTS (EARLY ENTRY SAW METHOD) ....228
TIE BARS ALONG LONGITUDINAL JOINT FOR SHORT RADIUS CURVES ....228
QUALITY CONTROL PROGRAM ....229
REPLACE EXISTING PAVEMENT DELINEATION ....232
MEASUREMENT AND PAYMENT ....232
10-1.25 SEAL EXISTING CONCRETE PAVEMENT JOINT ....233
MATERIALS ....233
PREPARE JOINTS IN EXISTING CONCRETE PAVEMENT ....233
MEASUREMENT AND PAYMENT ....234
10-1.26 GRIND EXISTING CONCRETE PAVEMENT ....234
10-1.27 DISPOSAL OF PORTLAND CEMENT CONCRETE (PCC) PAVEMENT GROOVING AND GRINDING RESIDUES ....235
10-1.28 STRUCTURE APPROACH SLABS (TYPE R) ....237
GENERAL ....237
TEMPORARY ROADWAY STRUCTURAL SECTION ....237
REMOVING PORTIONS OF EXISTING STRUCTURES ....238
REMOVING EXISTING PAVEMENT AND BASE MATERIALS ....238
AGGREGATE BASE (APPROACH SLAB) ....238
STRUCTURE APPROACH SLAB ....238
JOINTS ....239
MEASUREMENT AND PAYMENT ....240
10-1.29 PAVING NOTCH EXTENSION ....240
10-1.30 SEALING JOINTS ....241
10-1.31 REINFORCEMENT ....241
10-1.32 FURNISH SIGN ....241
SHEET ALUMINUM ....242
RETROREFLECTIVE SHEETING ....242
PROCESS COLOR AND FILM ....242
SINGLE SHEET ALUMINUM SIGN ....242
FIBERGLASS REINFORCED PLASTIC PANEL SIGN ....243
10-1.33 METAL BEAM GUARD RAILING ....243
ALTERNATIVE IN-LINE TERMINAL SYSTEM ....243
ALTERNATIVE FLARED TERMINAL SYSTEM ....244
10-1.34 TRANSITION RAILING (TYPE WB) ....245
10-1.35 THERMOPLASTIC TRAFFIC STRIPE ....245
10-1.36 PAVEMENT MARKERS ....245
SECTION 10-2. (BLANK) ....246
SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS ....246
10-3.01 DESCRIPTION ....246

10-3.02 ABBREVIATIONS AND GLOSSARY ..... 246
10-3.03 COST BREAK-DOWN ..... 250
10-3.04 EQUIPMENT LIST AND DRAWINGS ..... 251
10-3.05 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS ..... 251
RESTRICTIONS OF EXISTING RAMP METERING SYSTEM ..... 251
MAINTAINING EXISTING COMMUNICATION SYSTEM ROUTING ..... 251
10-3.06 MODIFY COMMUNICATION SYSTEM ROUTING ..... 252
GENERAL ..... 252
10-3.07 CONDUIT ..... 252
COMMUNICATION CONDUIT ..... 253
10-3.08 CONDUCTORS AND WIRING ..... 254
10-3.09 FIBER OPTIC CABLE ..... 254
DEFINITIONS ..... 254
FIBER OPTIC OUTSIDE PLANT CABLE ..... 255
LABELING ..... 259
CABLE INSTALLATION ..... 261
SPLICING ..... 262
SPLICE CLOSURES ..... 262
SPLICE TRAYS ..... 262
PASSIVE CABLE ASSEMBLIES AND COMPONENTS ..... 263
FIBER OPTIC CABLE TERMINATIONS ..... 263
FIBER OPTIC TESTING ..... 265
10-3.10 CABLE NODE DOCUMENTATION ..... 269
10-3.11 SYSTEM TESTING AND DOCUMENTATION ..... 269
FINAL ACCEPTANCE TESTING ..... 271
SYSTEM DOCUMENTATION ..... 272
FINAL ACCEPTANCE ..... 273
10-3.12 BONDING AND GROUNDING ..... 274
10-3.13 DETECTORS ..... 274
10-3.14 PAYMENT ..... 274
SECTION 11. (BLANK) ..... 274
SECTION 12. (BLANK) ..... 274
SECTION 13. RELATIONS WITH RAILROAD ..... 274
13.1.01 GENERAL ..... 274
SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS ..... 275
FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS ..... 294

# STANDARD PLANS LIST

The Standard Plan sheets applicable to this contract include, but are not limited to those indicated below. The Revised Standard Plans (RSP) and New Standard Plans (NSP) which apply to this contract are included as individual sheets of the project plans.

| | |
|---|---|
| A10A | Acronyms and Abbreviations (A-L) |
| A10B | Acronyms and Abbreviations (M-Z) |
| A10C | Symbols (Sheet 1 of 2) |
| A10D | Symbols (Sheet 2 of 2) |
| A20A | Pavement Markers and Traffic Lines, Typical Details |
| A20B | Pavement Markers and Traffic Lines, Typical Details |
| A20C | Pavement Markers and Traffic Lines, Typical Details |
| A20D | Pavement Markers and Traffic Lines, Typical Details |
| A62A | Excavation and Backfill – Miscellaneous Details |
| A62C | Limits of Payment for Excavation and Backfill - Bridge |
| A77A1 | Metal Beam Guard Railing – Standard Railing Section (Wood Post With Wood Block) |
| A77B1 | Metal Beam Guard Railing – Standard Hardware |
| A77C1 | Metal Beam Guard Railing – Wood Post and Wood Block Details |

| | |
|---|---|
| A77C3 | Metal Beam Guard Railing – Typical Line Post Embedment and Hinge Point Offset Details |
| A77C4 | Metal Beam Guard Railing – Typical Railing Delineation and Dike Positioning Details |
| A77E1 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77E2 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77E3 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77E4 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77E5 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77E6 | Metal Beam Guard Railing – Typical Layouts for Embankments |
| A77F1 | Metal Beam Guard Railing – Typical Layouts for Structure Approach |
| A77F2 | Metal Beam Guard Railing – Typical Layouts for Structure Approach and Between Structures |
| A77F3 | Metal Beam Guard Railing – Typical Layouts for Structure Approach |
| A77F4 | Metal Beam Guard Railing – Typical Layouts for Structure Departure |
| A77F5 | Metal Beam Guard Railing – Typical Layouts for Structure Departure |
| A77G2 | Metal Beam Guard Railing – Typical Layouts for Fixed Objects Between Separate Roadbeds (One Way Traffic) |
| A77G3 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77G4 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77G5 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77G6 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77G7 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77G8 | Metal Beam Guard Railing – Typical Layouts for Roadside Fixed Objects |
| A77H1 | Metal Railing End Anchor Assembly (Type SFT) |
| A77H2 | Metal Railing Rail Tensioning Assembly |
| A77H3 | Metal Railing Anchor Cable and Anchor Plate Details |
| A77I1 | Metal Railing End Anchor Assembly (Type CA) |
| A77I2 | Metal Beam Guard Railing – Buried Post End Anchor |
| A77J1 | Metal Beam Guard Railing Connections To Bridge Railings Without Sidewalks Details No.1 |
| A77J2 | Metal Beam Guard Railing Connections To Bridge Railings Without Sidewalks Details No2 |
| A77J3 | Metal Beam Guard Railing Connections to Abutments and Walls |
| A77J4 | Metal Beam Guard Railing Transition Railing (Type WB) |
| A77K1 | Metal Beam Guard Railing Connections to Bridge Railings with Sidewalks Details No. 1 |
| A77K2 | Metal Beam Guard Railing Connections to Bridge Railings with Sidewalks Details No. 2 |
| A77L1 | Metal Beam Railing Terminal System (Type SRT) |
| A77L2 | Metal Beam Railing Terminal System (Type SKT) |
| A77L3 | Metal Beam Railing Terminal System (Type ET) |
| A77L5 | Metal Beam Railing Terminal System (Type FLEAT) |
| A87B | Asphalt Concrete Dikes |
| P1 | Jointed Plain Concrete Pavement |
| P2 | Jointed Plain Concrete Pavement – Wide Panel Details |
| P5 | Undoweled Jointed Plain Concrete Pavement |
| P10 | Concrete Pavement – Dowel Bar Details |
| P12 | Concrete Pavement – Dowel Bar Basket Details |
| P17 | Concrete Pavement Tie Bar Basket Details |
| P18 | Concrete Pavement – Lane Schematics and Isolation Joint Detail |
| P20 | Concrete Pavement – Joint Details |
| P30 | Concrete Pavement – End Panel Pavement Transitions |
| P35 | Concrete Pavement – Ramp Gore Area Paving Details |
| P45 | Concrete Pavement Drainage Inlet Details No. 1 |
| P46 | Concrete Pavement Drainage Inlet Details No. 2 |
| T1A | Temporary Crash Cushion, Sand Filled (Unidirectional) |
| T1B | Temporary Crash Cushion, Sand Filled (Bidirectional) |
| T2 | Temporary Crash Cushion, Sand Filled (Shoulder Installations) |
| T3 | Temporary Railing (Type K) |

| | |
|---|---|
| RSP T7 | Construction Project Funding Identification Signs |
| RSP T10 | Traffic Control System for Lane Closure On Freeways and Expressways |
| RSP T10A | Traffic Control System for Lane and Complete Closures On Freeways and Expressways |
| RSP T14 | Traffic Control System for Ramp Closure |
| B0-3 | Bridge Details |
| RSP B6-21 | Joint Seals (Maximum Movement Rating = 50 mm) |
| RS1 | Roadside Signs, Typical Installation Details No. 1 |
| RS2 | Roadside Signs - Wood Post, Typical Installation Details No. 2 |
| RS3 | Roadside Signs - Laminated Wood Box Post Typical Installation Details No. 3 |
| S93 | Framing Details for Framed Single Sheet Aluminum Signs, Rectangular Shape |
| S94 | Roadside Single Sheet Aluminum Sign, Rectangular Shape |
| S95 | Roadside Single Sheet Aluminum Sign, Diamond Shape |
| ES-1A | Electrical Systems (Symbols And Abbreviations) |
| ES-1B | Electrical Systems (Symbols And Abbreviations) |
| ES-1C | Electrical Systems (Symbols And Abbreviations) |
| ES-5A | Electrical Systems (Detectors) |
| ES-5B | Electrical Systems (Detectors) |
| ES-5D | Electrical Systems (Detectors) |
| ES-8 | Electrical Systems (Pull Box Details) |
| ES-13A | Electrical Systems (Splicing Details) |
| ES-13B | Electrical Systems (Wiring Details and Fuse Ratings) |

**DEPARTMENT OF TRANSPORTATION**

# NOTICE TO CONTRACTORS

**CONTRACT NO. 07-193104**

**07-LA-5-27.2/46.4**

Sealed proposals for the work shown on the plans entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN LOS ANGELES COUNTY IN LOS ANGELES, GLENDALE AND BURBANK FROM THE 5/10/60/101 SEPARATION TO PROVIDENCIA AVENUE OVERHEAD**

will be received at the Department of Transportation, 3347 Michelson Drive, Suite 100, Irvine, CA 92612-1692, until 2 o'clock p.m. on September 29, 2005, at which time they will be publicly opened and read in Room C - 1116 at the same address.

Proposal forms for this work are included in a separate book entitled:

**STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN LOS ANGELES COUNTY IN LOS ANGELES, GLENDALE AND BURBANK FROM THE 5/10/60/101 SEPARATION TO PROVIDENCIA AVENUE OVERHEAD**

General work description: Existing PCC pavement to be replaced with rapid strength PCC.

This project has a goal of 8 percent disadvantaged business enterprise (DBE) participation.

No prebid meeting is scheduled for this project.

**THIS PROJECT IS SUBJECT TO THE "BUY AMERICA" PROVISIONS OF THE SURFACE TRANSPORTATION ASSISTANCE ACT OF 1982 AS AMENDED BY THE INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991.**

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or one of the following Class C licenses: C-8.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Inquiries or questions based on alleged patent ambiguity of the plans, specifications or estimate must be communicated as a bidder inquiry prior to bid opening. Any such inquiries or questions, submitted after bid opening, will not be treated as a bid protest.

Bidder inquiries may be submitted by one of the following methods:

1. Mail: District 7 Construction Duty Senior, 100 South Main Street, 3rd Floor, MS-7, Los Angeles, CA 90012.
2. Phone: (213) 897-0054.
3. Fax: (213) 897-0637.
4. E-mail: Duty_Senior_D7@dot.ca.gov.
5. Website at: http://www.dot.ca.gov/dist07/construction/bir/

To expedite processing, the preferred method for submission of bidder inquiries is via "Bidder's Inquiry & Response Website."

Project plans, special provisions, and proposal forms for bidding this project can only be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, MS #26, Transportation Building, 1120 N Street, Sacramento, California 95814, FAX No. (916) 654-7028, Telephone No. (916) 654-4490. Use FAX orders to expedite orders for project plans, special provisions and proposal forms. FAX orders must include credit card charge number, card expiration date and authorizing signature. Project plans, special provisions, and proposal forms may be seen at the above Department of Transportation office and at the offices of the District Directors of Transportation at Irvine, Oakland, and the district in which the work is situated. Standard Specifications and Standard Plans are available through the State of California, Department of Transportation, Publications Unit, 1900 Royal Oaks Drive, Sacramento, CA 95815, Telephone No. (916) 445-3520.

The successful bidder shall furnish a payment bond and a performance bond.

The Department of Transportation hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation.

The U.S. Department of Transportation (DOT) provides a toll-free "hotline" service to report bid rigging activities. Bid rigging activities can be reported Mondays through Fridays, between 8:00 a.m. and 5:00 p.m., eastern time, Telephone No. 1-800-424-9071. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report these activities. The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' internet web site at: http://www.dir.ca.gov. The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are available through the California Department of Transportation's Electronic Project Document Distribution Site on the internet at http://hqidoc1.dot.ca.gov/. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of "Proposal and Contract" books. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

If there is a difference between the minimum wage rates predetermined by the United States Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated August 1, 2005

EFO

**COPY OF ENGINEER'S ESTIMATE**

**(NOT TO BE USED FOR BIDDING PURPOSES)**

**07-193104**

| Item No. | Item Code | Item Description | Unit of Measure | Estimated Quantity |
|---|---|---|---|---|
| 1 | 070012 | PROGRESS SCHEDULE (CRITICAL PATH METHOD) | LS | LUMP SUM |
| 2 | 070018 | TIME-RELATED OVERHEAD | WDAY | 925 |
| 3 | 074017 | PREPARE WATER POLLUTION CONTROL PROGRAM | LS | LUMP SUM |
| 4 | 074020 | WATER POLLUTION CONTROL | LS | LUMP SUM |
| 5 (S) | 120090 | CONSTRUCTION AREA SIGNS | LS | LUMP SUM |
| 6 (S) | 120100 | TRAFFIC CONTROL SYSTEM | LS | LUMP SUM |
| 7 (S) | 150662 | REMOVE METAL BEAM GUARD RAILING | M | 400 |
| 8 | 150771 | REMOVE ASPHALT CONCRETE DIKE | M | 1250 |
| 9 (S) | 153103 | COLD PLANE ASPHALT CONCRETE PAVEMENT | M2 | 4910 |
| 10 | 190110 | LEAD COMPLIANCE PLAN | LS | LUMP SUM |
| 11 | 260210 | AGGREGATE BASE (APPROACH SLAB) | M3 | 662 |
| 12 | 390103 | ASPHALT CONCRETE (TYPE B) | TONN | 630 |
| 13 | 394002 | PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA) | M2 | 53 |
| 14 | 394044 | PLACE ASPHALT CONCRETE DIKE (TYPE C) | M | 250 |
| 15 | 394049 | PLACE ASPHALT CONCRETE DIKE (TYPE F) | M | 1510 |
| 16 | 401108 | REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE) | M3 | 29 600 |
| 17 | 404092 | SEAL PAVEMENT JOINT | M | 40 600 |
| 18 | 404094 | SEAL LONGITUDINAL ISOLATION JOINT | M | 7860 |
| 19 | 406003 | TIE BAR (DRILL AND BOND) | EA | 20 300 |
| 20 | 413115 | SEAL JOINT (EXISTING CONCRETE PAVEMENT) | M | 27 500 |

| Item No. | Item Code | Item Description | Unit of Measure | Estimated Quantity |
|---|---|---|---|---|
| 21 (S) | 420201 | GRIND EXISTING CONCRETE PAVEMENT | M2 | 186 000 |
| 22 | 510087 | STRUCTURAL CONCRETE, APPROACH SLAB (TYPE R) | M3 | 4399 |
| 23 | 510800 | PAVING NOTCH EXTENSION | M3 | 46 |
| 24 | 034954 | DOWEL (SMOOTH, EPOXY COATED) | EA | 89 600 |
| 25 (S) | 519117 | JOINT SEAL (MR 30 MM) | M | 479 |
| 26 (S) | 519120 | JOINT SEAL (MR 15 MM) | M | 1234 |
| 27 (S) | 519142 | JOINT SEAL (MR 40 MM) | M | 13 |
| 28 (S) | 832001 | METAL BEAM GUARD RAILING | M | 2870 |
| 29 (S) | 839541 | TRANSITION RAILING (TYPE WB) | EA | 19 |
| 30 (S) | 034955 | END CAP (TYPE C) | EA | 12 |
| 31 (S) | 839568 | TERMINAL ANCHOR ASSEMBLY (TYPE SFT) | EA | 6 |
| 32 (S) | 839584 | ALTERNATIVE IN-LINE TERMINAL SYSTEM | EA | 3 |
| 33 (S) | 839585 | ALTERNATIVE FLARED TERMINAL SYSTEM | EA | 7 |
| 34 (S) | 840561 | 100 MM THERMOPLASTIC TRAFFIC STRIPE | M | 31 000 |
| 35 (S) | 840563 | 200 MM THERMOPLASTIC TRAFFIC STRIPE | M | 520 |
| 36 (S) | 840564 | 200 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 3.66 M - 0.92 M) | M | 3990 |
| 37 (S) | 840570 | 100 MM THERMOPLASTIC TRAFFIC STRIPE (BROKEN 10.98 M - 3.66 M) | M | 49 800 |
| 38 (S) | 850101 | PAVEMENT MARKER (NON-REFLECTIVE) | EA | 13 400 |
| 39 (S) | 850111 | PAVEMENT MARKER (RETROREFLECTIVE) | EA | 5070 |
| 40 (S) | 860890 | MODIFY TRAFFIC MONITORING STATION (COUNT) | LS | LUMP SUM |

| Item No. | Item Code | Item Description | Unit of Measure | Estimated Quantity |
|---|---|---|---|---|
| 41 (S) | 034956 | COMMUNICATION SYSTEM ROUTING (MODIFY) | LS | LUMP SUM |
| 42 (S) | 861088 | MODIFY RAMP METERING SYSTEM | LS | LUMP SUM |
| 43 | 999990 | MOBILIZATION | LS | LUMP SUM |

**STATE OF CALIFORNIA**

**DEPARTMENT OF TRANSPORTATION**

---

# SPECIAL PROVISIONS

**Annexed to Contract No. 07-193104**

**SECTION 1. SPECIFICATIONS AND PLANS**

The work embraced herein shall conform to the provisions in the Standard Specifications dated July 1999, and the Standard Plans dated July 2004, of the Department of Transportation insofar as the same may apply, and these special provisions.

In case of conflict between the Standard Specifications and these special provisions, the special provisions shall take precedence over and shall be used in lieu of the conflicting portions.

# AMENDMENTS TO JULY 1999 STANDARD SPECIFICATIONS

**UPDATED JANUARY 28, 2005**

Amendments to the Standard Specifications set forth in these special provisions shall be considered as part of the Standard Specifications for the purposes set forth in Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications and Special Provisions," of the Standard Specifications. Whenever either the term "Standard Specifications is amended" or the term "Standard Specifications are amended" is used in the special provisions, the text or table following the term shall be considered an amendment to the Standard Specifications. In case of conflict between such amendments and the Standard Specifications, the amendments shall take precedence over and be used in lieu of the conflicting portions.

**SECTION 1: DEFINITIONS AND TERMS**

Issue Date: January 28, 2005

Section 1-1.265, "Manual of Traffic Controls," of the Standard Specifications is amended to read:

**1-1.265 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES**

- The Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition (MUTCD) is administered by the Federal Highway Administration.

Section 1, "Definitions and Terms," of the Standard Specifications is amended by adding the following section:

**1-1.266 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES CALIFORNIA SUPPLEMENT**

- The MUTCD 2003 California Supplement (MUTCD California Supplement) is issued by the Department of Transportation to provide amendments to the MUTCD. The MUTCD and MUTCD California Supplement supersede the Department's Manual of Traffic Controls.

## SECTION 2: PROPOSAL REQUIREMENTS AND CONDITIONS

Issue Date: June 19, 2003

Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications is amended to read:

**2-1.03 Examination of Plans, Specifications, Contract, and Site of Work**

- The bidder shall examine carefully the site of the work contemplated, the plans and specifications, and the proposal and contract forms therefor. The submission of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the general and local conditions to be encountered, as to the character, quality and scope of work to be performed, the quantities of materials to be furnished and as to the requirements of the proposal, plans, specifications and the contract.
- The submission of a bid shall also be conclusive evidence that the bidder is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information was reasonably ascertainable from an inspection of the site and the records of exploratory work done by the Department as shown in the bid documents, as well as from the plans and specifications made a part of the contract.
- Where the Department has made investigations of site conditions including subsurface conditions in areas where work is to be performed under the contract, or in other areas, some of which may constitute possible local material sources, bidders or contractors may, upon written request, inspect the records of the Department as to those investigations subject to and upon the conditions hereinafter set forth.
- Where there has been prior construction by the Department or other public agencies within the project limits, records of the prior construction that are currently in the possession of the Department and which have been used by, or are known to, the designers and administrators of the project will be made available for inspection by bidders or contractors, upon written request, subject to the conditions hereinafter set forth. The records may include, but are not limited to, as-built drawings, design calculations, foundation and site studies, project reports and other data assembled in connection with the investigation, design, construction and maintenance of the prior projects.
- Inspection of the records of investigations and project records may be made at the office of the district in which the work is situated, or in the case of records of investigations related to structure work, at the Transportation Laboratory in Sacramento, California.
- When a log of test borings or other record of geotechnical data obtained by the Department's investigation of surface and subsurface conditions is included with the contract plans, it is furnished for the bidders' or Contractor's information and its use shall be subject to the conditions and limitations set forth in this Section 2-1.03.
- In some instances, information considered by the Department to be of possible interest to bidders or contractors has been compiled as "Materials Information." The use of the "Materials Information" shall be subject to the conditions and limitations set forth in this Section 2-1.03 and Section 6-2, "Local Materials."
- When cross sections are not included with the plans, but are available, bidders or contractors may inspect the cross sections and obtain copies for their use, at their expense.
- When cross sections are included with the contract plans, it is expressly understood and agreed that the cross sections do not constitute part of the contract, do not necessarily represent actual site conditions or show location, character, dimensions and details of work to be performed, and are included in the plans only for the convenience of bidders and their use is subject to the conditions and limitations set forth in this Section 2-1.03.
- When contour maps were used in the design of the project, the bidders may inspect those maps, and if available, they may obtain copies for their use.
- The availability or use of information described in this Section 2-1.03 is not to be construed in any way as a waiver of the provisions of the first paragraph in this Section 2-1.03 and bidders and contractors are cautioned to make independent investigations and examinations as they deem necessary to be satisfied as to conditions to be encountered in the performance of the work and, with respect to possible local material sources, the quality and quantity of material available from the property and the type and extent of processing that may be required in order to produce material conforming to the requirements of the specifications.
- The Department assumes no responsibility for conclusions or interpretations made by a bidder or contractor based on the information or data made available by the Department. The Department does not assume responsibility for representation made by its officers or agents before the execution of the contract concerning surface or subsurface conditions, unless that representation is expressly stated in the contract.
- No conclusions or interpretations made by a bidder or contractor from the information and data made available by the Department will relieve a bidder or contractor from properly fulfilling the terms of the contract.

## SECTION 5: CONTROL OF WORK

Issue Date: December 31, 2001

Section 5-1.02A, "Trench Excavation Safety Plans," of the Standard Specifications is amended to read:

**5-1.02A Excavation Safety Plans**

- The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.
- Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.
- No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.
- If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.
- Attention is directed to Section 7-1.01E, "Trench Safety."

## SECTION 7: LEGAL RELATIONS AND RESPONSIBILITY

Issue Date: January 28, 2005

The eighth paragraph of Section 7-1.09, "Public Safety" of the Standard Specifications is amended to read:

- Signs, lights, flags, and other warning and safety devices and their use shall conform to the requirements set forth in Part 6 of the MUTCD and of the MUTCD California Supplement. Signs or other protective devices furnished and erected by the Contractor, at the Contractor's expense, as above provided, shall not obscure the visibility of, nor conflict in intent, meaning and function of either existing signs, lights and traffic control devices or any construction area signs and traffic control devices for which furnishing of, or payment for, is provided elsewhere in the specifications. Signs furnished and erected by the Contractor, at the Contractor's expense, shall be approved by the Engineer as to size, wording and location.

The fourteenth paragraph of Section 7-1.09, "Public Safety," of the Standard Specifications is amended to read:

- The Contractor shall notify the Engineer not less than 18 days and no more than 90 days prior to the anticipated start of an operation that will change the vertical or horizontal clearance available to public traffic (including shoulders).

The sixteenth paragraph of Section 7-1.09, "Public Safety," of the Standard Specifications is amended to read:

- When vertical clearance is temporarily reduced to 4.72 m or less, low clearance warning signs shall be placed in accordance with Part 2 of the MUTCD and the MUTCD California Supplement, and as directed by the Engineer. Signs shall conform to the dimensions, color, and legend requirements of the MUTCD, the MUTCD California Supplement, and these specifications except that the signs shall have black letters and numbers on an orange retroreflective background. W12-2P signs shall be illuminated so that the signs are clearly visible.

## SECTION 9: MEASUREMENT AND PAYMENT

Issue Date: November 17, 2004

Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications is amended to read:

**9-1.04 NOTICE OF POTENTIAL CLAIM**

- It is the intention of this section that disputes between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that the matters may be resolved, if possible, or other appropriate action promptly taken.
- Disputes will not be considered unless the Contractor has first complied with specified notice or protest requirements, including Section 4-1.03, "Changes," Section 5-1.116, "Differing Site Conditions," Section 8-1.06, "Time of Completion," Section 8-1.07, "Liquidated Damages," and Section 8-1.10, "Utility and Non-Highway Facilities."
- For disputes arising under and by virtue of the contract, including an act or failure to act by the Engineer, the Contractor shall provide a signed written initial notice of potential claim to the Engineer within 5 days from the date the dispute first arose. The initial notice of potential claim shall provide the nature and circumstances involved in the dispute which shall remain consistent through the dispute. The initial notice of potential claim shall be submitted on Form CEM-6201A furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Contractor shall assign an exclusive identification number for each dispute, determined by chronological sequencing, based on the date of the dispute.
- The exclusive identification number for each dispute shall be used on the following corresponding documents:

A. Initial notice of potential claim.
B. Supplemental notice of potential claim.
C. Full and final documentation of potential claim.
D. Corresponding claim included in the Contractor's written statement of claims.

- The Contractor shall provide the Engineer the opportunity to examine the site of work within 5 days from the date of the initial notice of potential claim. The Contractor shall proceed with the performance of contract work unless otherwise specified or directed by the Engineer.
- Throughout the disputed work, the Contractor shall maintain records that provide a clear distinction between the incurred direct costs of disputed work and that of undisputed work. The Contractor shall allow the Engineer access to the Contractor's project records deemed necessary by the Engineer to evaluate the potential claim within 20 days of the date of the Engineer's written request.
- Within 15 days of submitting the initial notice of potential claim, the Contractor shall provide a signed supplemental notice of potential claim to the Engineer that provides the following information:

A. The complete nature and circumstances of the dispute which caused the potential claim.
B. The contract provisions that provide the basis of claim.
C. The estimated cost of the potential claim, including an itemized breakdown of individual costs and how the estimate was determined.
D. A time impact analysis of the project schedule that illustrates the effect on the scheduled completion date due to schedule changes or disruptions where a request for adjustment of contract time is made.

- The information provided in items A and B above shall provide the Contractor's complete reasoning for additional compensation or adjustments.
- The supplemental notice of potential claim shall be submitted on Form CEM-6201B furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655. The Engineer will evaluate the information presented in the supplemental notice of potential claim and provide a written response to the Contractor within 20 days of its receipt. If the estimated cost or effect on the scheduled completion date changes, the Contractor shall update information in items C and D above as soon as the change is recognized and submit this information to the Engineer.
- Within 30 days of the completion of work related to the potential claim, the Contractor shall provide the full and final documentation of potential claim to the Engineer that provides the following information:

A. A detailed factual narration of events fully describing the nature and circumstances that caused the dispute, including, but not limited to, necessary dates, locations, and items of work affected by the dispute.
B. The specific provisions of the contract that support the potential claim and a statement of the reasons these provisions support and provide a basis for entitlement of the potential claim.
C. When additional monetary compensation is requested, the exact amount requested calculated in conformance with Section 9-1.03, "Force Account Payment," or Section 8-1.09, "Right of Way Delays," including an itemized breakdown of individual costs. These costs shall be segregated into the following cost categories:

1. Labor – A listing of individuals, classifications, regular hours and overtime hours worked, dates worked, and other pertinent information related to the requested reimbursement of labor costs.
2. Materials – Invoices, purchase orders, location of materials either stored or incorporated into the work, dates materials were transported to the project or incorporated into the work, and other pertinent information related to the requested reimbursement of material costs.
3. Equipment – Listing of detailed description (make, model, and serial number), hours of use, dates of use and equipment rates. Equipment rates shall be at the applicable State rental rate as listed in the Department of Transportation publication entitled "Labor Surcharge and Equipment Rental Rates," in effect when the affected work related to the dispute was performed.
4. Other categories as specified by the Contractor or the Engineer.

D. When an adjustment of contract time is requested the following information shall be provided:

1. The specific dates for which contract time is being requested.
2. The specific reasons for entitlement to a contract time adjustment.
3. The specific provisions of the contract that provide the basis for the requested contract time adjustment.
4. A detailed time impact analysis of the project schedule. The time impact analysis shall show the effect of changes or disruptions on the scheduled completion date to demonstrate entitlement to a contract time adjustment.

E. The identification and copies of the Contractor's documents and the substance of oral communications that support the potential claim.

- The full and final documentation of the potential claim shall be submitted on Form CEM-6201C furnished by the Department and shall be certified with reference to the California False Claims Act, Government Code Sections 12650-12655.
- Pertinent information, references, arguments, and data to support the potential claim shall be included in the full and final documentation of potential claim. Information submitted subsequent to the full and final documentation submittal will not be considered. Information required in the full and final documentation of potential claim, as listed in items A to E above, that is not applicable to the dispute may be exempted as determined by the Engineer. No full and final documentation of potential claim will be considered that does not have the same nature and circumstances, and basis of claim as those specified on the initial and supplemental notices of potential claim.
- The Engineer will evaluate the information presented in the full and final documentation of potential claim and provide a written response to the Contractor within 30 days of its receipt unless otherwise specified. The Engineer's receipt of the full and final documentation of potential claim shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand. If the full and final documentation of potential claim is submitted by the Contractor after acceptance of the work by the Director, the Engineer need not provide a written response.
- Provisions in this section shall not apply to those claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate. Administrative disputes are disputes of administrative deductions or retentions, contract item quantities, contract item adjustments, interest payments, protests of contract change orders as provided in Section 4-1.03A, "Procedure and Protest," and protests of the weekly statement of working days as provided in Section 8-1.06, "Time of Completion." Administrative disputes that occur prior to issuance of the proposed final estimate shall follow applicable requirements of this section. Information listed in the supplemental notice and full and final documentation of potential claim that is not applicable to the administrative dispute may be exempted as determined by the Engineer.
- Unless otherwise specified in the special provisions, the Contractor may pursue the administrative claim process pursuant to Section 9-1.07B, "Final Payment and Claims," for any potential claim found by the Engineer to be without merit.
- Failure of the Contractor to conform to specified dispute procedures shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract, and is deemed as the Contractor's waiver of the potential claim and a waiver of the right to a corresponding claim for the disputed work in the administrative claim process in conformance with Section 9-1.07B, "Final Payment of Claims," and shall operate as a bar to arbitration pursuant to Section 10240.2 of the California Public Contract Code.

Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications is amended to read:

**9-1.07B Final Payment and Claims**

- After acceptance by the Director, the Engineer will make a proposed final estimate in writing of the total amount payable to the Contractor, including an itemization of the total amount, segregated by contract item quantities, extra work and other bases for payment, and shall also show each deduction made or to be made for prior payments and amounts to be kept

or retained under the provisions of the contract. Prior estimates and payments shall be subject to correction in the proposed final estimate. The Contractor shall submit written approval of the proposed final estimate or a written statement of claims arising under or by virtue of the contract so that the Engineer receives the written approval or statement of claims no later than close of business of the thirtieth day after receiving the proposed final estimate. If the thirtieth day falls on a Saturday, Sunday or legal holiday, then receipt of the written approval or statement of claims by the Engineer shall not be later than close of business of the next business day. The Contractor's receipt of the proposed final estimate shall be evidenced by postal receipt. The Engineer's receipt of the Contractor's written approval or statement of claims shall be evidenced by postal receipt or the Engineer's written receipt if delivered by hand.

- On the Contractor's approval, or if the Contractor files no claim within the specified period of 30 days, the Engineer will issue a final estimate in writing in conformance with the proposed final estimate submitted to the Contractor, and within 30 days thereafter the State will pay the entire sum so found to be due. That final estimate and payment thereon shall be conclusive and binding against both parties to the contract on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."
- If the Contractor within the specified period of 30 days files claims, the Engineer will issue a semifinal estimate in conformance with the proposed final estimate submitted to the Contractor and within 30 days thereafter the State will pay the sum found to be due. The semifinal estimate and corresponding payment shall be conclusive and binding against both parties to the contract on each question relating to the amount of work done and the compensation payable therefor, except insofar as affected by the claims filed within the time and in the manner required hereunder and except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."
- Except for claims for overhead costs and administrative disputes that occur after issuance of the proposed final estimate, the Contractor shall only provide the following two items of information for each claim:

A. The exclusive identification number that corresponds to the supporting full and final documentation of potential claim.
B. The final amount of requested additional compensation.

- If the final amount of requested additional compensation is different than the amount of requested compensation included in the full and final documentation of potential claim, the Contractor shall provide in the written statement of claims the reasons for the changed amount, the specific provisions of the contract which support the changed amount, and a statement of the reasons the provisions support and provide a basis for the changed amount. If the Contractor's claim fails to provide an exclusive identification number or if there is a disparity in the provided exclusive identification number, the Engineer will notify the Contractor of the omission or disparity. The Contractor shall have 15 days after receiving notification from the Engineer to correct the omission or disparity. If after the 15 days has elapsed, there is still an omission or disparity of the exclusive identification number assigned to the claim, the Engineer will assign the number. No claim will be considered that has any of the following deficiencies:

A. The claim does not have the same nature, circumstances, and basis as the corresponding full and final documentation of potential claim.
B. The claim does not have a corresponding full and final documentation of potential claim.
C. The claim was not included in the written statement of claims.
D. The Contractor did not comply with applicable notice or protest requirements of Sections 4-1.03, "Changes," 5-1.116, "Differing Site Condition," 8-1.06, "Time of Completion," 8-1.07, "Liquidated Damages," 8-1.10, "Utility and Non-Highway Facilities," and 9-1.04, "Notice of Potential Claim."

- Administrative disputes that occur after issuance of the proposed final estimate shall be included in the Contractor's written statement of claims in sufficient detail to enable the Engineer to ascertain the basis and amounts of those claims.
- The Contractor shall keep full and complete records of the costs and additional time incurred for work for which a claim for additional compensation is made. The Engineer or designated claim investigators or auditors shall have access to those records and any other records as may be required by the Engineer to determine the facts or contentions involved in the claims. Failure to permit access to those records shall be sufficient cause for denying the claims.

- The written statement of claims submitted by the Contractor shall be accompanied by a notarized certificate containing the following language:

> Under the penalty of law for perjury or falsification and with specific reference to the California False Claims Act, Government Code Section 12650 et. seq., the undersigned,
>
> _____ .
> *(name)*
>
> _____ *of*
> *(title)*
>
> _____ .
> *(company)*
>
> hereby certifies that the claim for the additional compensation and time, if any, made herein for the work on this contract is a true statement of the actual costs incurred and time sought, and is fully documented and supported under the contract between parties.
>
> Dated _____
>
> /s/ _____
>
> Subscribed and sworn before me this _____ day
>
> of _____ .
>
> _____
> *(Notary Public)*
> My Commission
> Expires _____

- Failure to submit the notarized certificate will be sufficient cause for denying the claim.
- Claims for overhead type expenses or costs, in addition to being certified as stated above, shall be supported and accompanied by an audit report of an independent Certified Public Accountant. Omission of a supporting audit report of an independent Certified Public Accountant shall result in denial of the claim and shall operate as a bar to arbitration, as to the claim, in conformance with the requirements in Section 10240.2 of the California Public Contract Code. Claims for overhead type expenses or costs shall be subject to audit by the State at its discretion. The costs of performing an audit examination and submitting the report shall be borne by the Contractor. The Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in Title 48 of the Federal Acquisition Regulations, Chapter 1, Part 31. The audit examination and report shall determine if the rates of field and home office overhead are:

A. Allowable in conformance with the requirements in Title 48 of the Federal Acquisition Regulations, Chapter 1, Part 31.
B. Adequately supported by reliable documentation.
C. Related solely to the project under examination.

- Costs or expenses incurred by the State in reviewing or auditing claims that are not supported by the Contractor's cost accounting or other records shall be deemed to be damages incurred by the State within the meaning of the California False Claims Act.
- If the Engineer determines that a claim requires additional analysis, the Engineer will schedule a board of review meeting. The Contractor shall meet with the review board or person and make a presentation in support of the claim. Attendance by the Contractor at the board of review meeting shall be mandatory.
- The District Director of the District that administered the contract will make the final determination of any claims which remain in dispute after completion of claim review by the Engineer or board of review meeting.

The final determination of claims will be sent to the Contractor by hand delivery or deposit in the U.S. mail. The Engineer will then make and issue the Engineer's final estimate in writing and within 30 days thereafter the State will pay the entire sum, if any, found due thereon. That final estimate shall be conclusive and binding against both parties to the contract

on all questions relating to the amount of work done and the compensation payable therefor, except as otherwise provided in Sections 9-1.03C, "Records," and 9-1.09, "Clerical Errors."

• Failure of the Contractor to conform to the specified dispute procedures shall constitute a failure to pursue diligently and exhaust the administrative procedures in the contract and shall operate as a bar to arbitration in conformance with the requirements in Section 10240.2 of the California Public Contract Code.

## SECTION 12: CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Issue Date: November 2, 2004

The second paragraph of Section 12-1.01, "Description," of the Standard Specifications is amended to read:

• Attention is directed to Part 6 of the MUTCD and of the MUTCD California Supplement. Nothing in this Section 12 is to be construed as to reduce the minimum standards in these manuals.

Section 12-2.01, "Flaggers," of the Standard Specifications is amended to read:

• Flaggers while on duty and assigned to traffic control or to give warning to the public that the highway is under construction and of any dangerous conditions to be encountered as a result thereof, shall perform their duties and shall be provided with the necessary equipment in conformance with Part 6 of the MUTCD and of the MUTCD California Supplement. The equipment shall be furnished and kept clean and in good repair by the Contractor at the Contractor's expense.

The first paragraph of Section 12-3.01, "General," of the Standard Specifications is amended to read:

• In addition to the requirements in Part 6 of the MUTCD and of the MUTCD California Supplement, all devices used by the Contractor in the performance of the work shall conform to the provisions in this Section 12-3.

The first paragraph of Section 12-3.06, "Construction Area Signs," of the Standard Specifications is amended to read:

• The term "Construction Area Signs" shall include all temporary signs required for the direction of public traffic through or around the work during construction. Construction area signs are shown in or referred to in Part 6 of the MUTCD and of the MUTCD California Supplement.

The fourth paragraph of Section 12-3.06, "Construction Area Signs," of the Standard Specifications is amended to read:

• All construction area signs shall conform to the dimensions, color and legend requirements of the plans, Part 6 of the MUTCD, Part 6 of the MUTCD California Supplement, and these specifications. All sign panels shall be the product of a commercial sign manufacturer, and shall be as specified in these specifications.

The eighth paragraph of Section 12-3.06, "Construction Area Signs," of the Standard Specifications is amended to read:

• Used signs with the specified sheeting material will be considered satisfactory if they conform to the requirements for visibility and legibility and the colors conform to the requirements in Part 6 of the MUTCD and of the MUTCD California Supplement. A significant difference between day and nighttime retroreflective color will be grounds for rejecting signs.

Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications is amended by deleting the third, fourth, fifth, and sixth paragraphs.

## SECTION 15: EXISTING HIGHWAY FACILITIES

Issue Date: November 2, 2004

The sixth paragraph of Section 15-2.07, "Payment," of the Standard Specifications is amended to read:

• Full compensation for removing, salvaging, reconstructing, relocating or resetting end caps, return caps, terminal sections, and buried post anchors, for metal beam guard railings and thrie beam barriers, and for connecting reconstructed,

relocated or reset railings and barriers to new and existing facilities, including connections to concrete, shall be considered as included in the contract price paid per meter for the type of railing or barrier work involved and no additional compensation will be allowed therefor.

## SECTION 19: EARTHWORK

Issue Date: December 31, 2001

The third paragraph of Section 19-1.02, "Preservation of Property," of the Standard Specifications is amended to read:

- In addition to the provisions in Sections 5-1.02, "Plans and Working Drawings," and 5-1.02A, "Excavation Safety Plans," detailed plans of the protective systems for excavations on or affecting railroad property will be reviewed for adequacy of protection provided for railroad facilities, property, and traffic. These plans shall be submitted at least 9 weeks before the Contractor intends to begin excavation requiring the protective systems. Approval by the Engineer of the detailed plans for the protective systems will be contingent upon the plans being satisfactory to the railroad company involved.

## SECTION 42: GROOVE AND GRIND PAVEMENT

Issue Date: December 31, 2001

The last sentence of the first subparagraph of the third paragraph in Section 42-2.02, "Construction," of the Standard Specifications is amended to read:

- After grinding has been completed, the pavement shall conform to the straightedge and profile requirements specified in Section 40-1.10, "Final Finishing."

## SECTION 49: PILING

Issue Date: November 2, 2004

The first paragraph in Section 49-1.03, "Determination of Length," of the Standard Specifications is amended to read:

- Foundation piles of any material shall be of such length as is required to obtain the specified penetration, and to extend into the cap or footing block as shown on the plans, or specified in the special provisions.

The fourth paragraph in Section 49-1.03, "Determination of Length," of the Standard Specifications is amended to read:

- Modification to the specified installation methods and specified pile tip elevation will not be considered at locations where tension or lateral load demands control design pile tip elevations or when the plans state that specified pile tip elevation shall not be revised.

The sixth and seventh paragraphs in Section 49-1.03, "Determination of Length," of the Standard Specifications are amended to read:

- Indicator compression pile load testing shall conform to the requirements in ASTM Designation: D 1143. The pile shall sustain the first compression test load applied which is equal to the nominal resistance in compression, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of compression load testing.
- Indicator tension pile load testing shall conform to the requirements in ASTM Designation: D 3689. The loading apparatus described as "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" shall not be used. The pile shall sustain the first tension test load applied which is equal to the nominal resistance in tension, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of tension load testing.

The ninth paragraph in Section 49-1.03, "Determination of Length," of the Standard Specifications is amended to read:

- For driven piling, the Contractor shall furnish piling of sufficient length to obtain the specified tip elevation shown on the plans or specified in the special provisions. For cast-in-drilled-hole concrete piling, the Contractor shall construct

piling of such length to develop the nominal resistance in compression and to obtain the specified tip elevation shown on the plans or specified in the special provisions.

The tenth paragraph in Section 49-1.03, "Determination of Length," of the Standard Specifications is deleted.

The fourth paragraph in Section 49-1.04, "Load Test Piles," of the Standard Specifications is amended to read:

• Load test piles and anchor piles which are not to be incorporated in the completed structure shall be removed in conformance with the provisions in Section 15-4.02, "Removal Methods," and the remaining holes shall be backfilled with earth or other suitable material approved by the Engineer.

The fifth paragraph in Section 49-1.04, "Load Test Piles," of the Standard Specifications is amended to read:

• Load test anchorages in piles used as anchor piles shall conform to the following requirements:

A. High strength threaded steel rods shall conform to the provisions for bars in Section 50-1.05, "Prestressing Steel," except Type II bars shall be used.
B. High strength steel plates shall conform to the requirements in ASTM Designation: A 709/A 709M, Grade 345.
C. Anchor nuts shall conform to the provisions in the second paragraph in Section 50-1.06, "Anchorages and Distribution."

The first paragraph in Section 49-1.05, "Driving Equipment," of the Standard Specifications is amended to read:

• Driven piles shall be installed with impact hammers that are approved in writing by the Engineer. Impact hammers shall be steam, hydraulic, air or diesel hammers. Impact hammers shall develop sufficient energy to drive the piles at a penetration rate of not less than 3 mm per blow at the specified nominal resistance.

The seventh paragraph in Section 49-1.05, "Driving Equipment," of the Standard Specifications is amended to read:

• When necessary to obtain the specified penetration and when authorized by the Engineer, the Contractor may supply and operate one or more water jets and pumps, or furnish the necessary drilling apparatus and drill holes not greater than the least dimension of the pile to the proper depth and drive the piles therein. Jets shall not be used at locations where the stability of embankments or other improvements would be endangered. In addition, for steel piles, steel shells, or steel casings, when necessary to obtain the specified penetration or to prevent damage to the pile during installation, the Contractor shall provide special driving tips or heavier pile sections or take other measures as approved by the Engineer.

• The use of followers or underwater hammers for driving piles will be permitted if authorized in writing by the Engineer. When a follower or underwater hammer is used, its efficiency shall be verified by furnishing the first pile in each bent or footing sufficiently long and driving the pile without the use of a follower or underwater hammer.

The second paragraph in Section 49-1.07, "Driving," of the Standard Specifications is amended to read:

• Timber piles shall be fresh-headed and square and when permitted by the Engineer, the heads of the piles may be protected by means of heavy steel or wrought iron rings. During driving operations timber piling shall be restrained from lateral movement at intervals not to exceed 6 m over the length between the driving head and the ground surface. During driving operations, the timber pile shall be kept moving by continuous operation of the hammer. When the blow count exceeds either 2 times the blow count required in 300 mm, or 3 times the blow count required in 75 mm for the nominal resistance as shown on the plans, computed in conformance with the provisions in Section 49-1.08, "Pile Driving Acceptance Criteria," additional aids shall be used to obtain the specified penetration. These aids may include the use of water jets or drilling, where permitted, or the use of a larger hammer employing a heavy ram striking with a low velocity.

Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications is amended to read:

**49-1.08 PILE DRIVING ACCEPTANCE CRITERIA**

• Except for piles to be load tested, driven piles shall be driven to a value of not less than the nominal resistance shown on the plans unless otherwise specified in the special provisions or permitted in writing by the Engineer. In addition, when a pile tip elevation is specified, driven piles shall penetrate at least to the specified tip elevation, unless otherwise permitted in writing by the Engineer. Piles to be load tested shall be driven to the specified tip elevation.

- When the pile nominal resistance is omitted from the plans or the special provisions, timber piles shall be driven to a nominal resistance of 800 kN, and steel and concrete piles shall be driven to a nominal resistance of 1250 kN.
- The nominal resistance for driven piles shall be determined from the following formula in which "$R_u$" is the nominal resistance in kilonewtons, "$E_r$" is the manufacturer's rating for joules of energy developed by the hammer at the observed field drop height, and "N" is the number of hammer blows in the last 300 millimeters. (maximum value to be used for N is 100):

$$R_u = (7 * (E_r)^{1/2} * \log_{10} (0.83 * N)) - 550$$

The first paragraph in Section 49-2.03, "Requirements," of the Standard Specifications is amended to read:

- When preservative treatment of timber piles is required by the plans or specified in the special provisions, the treatment shall conform to the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," and the applicable AWPA Use Category.

The first paragraph in Section 49-2.04, "Treatment of Pile Heads," of the Standard Specifications is amended to read:

A. An application of wood preservative conforming to the provisions in Section 58-1.04, "Wood Preservative for Manual Treatment," shall first be applied to the head of the pile and a protective cap shall then be built up by applying alternate layers of loosely woven fabric and hot asphalt or tar similar to membrane waterproofing, using 3 layers of asphalt or tar and 2 layers of fabric. The fabric shall measure at least 150 mm more in each direction than the diameter of the pile and shall be turned down over the pile and the edges secured by binding with 2 turns of No. 10 galvanized wire. The fabric shall be wired in advance of the application of the final layer of asphalt or tar, which shall extend down over the wiring.
B. The sawed surface shall be covered with 3 applications of a hot mixture of 60 percent creosote and 40 percent roofing pitch, or thoroughly brushcoated with 3 applications of hot creosote and covered with hot roofing pitch. A covering of 3.50-mm nominal thickness galvanized steel sheet shall be placed over the coating and bent down over the sides of each pile to shed water.

Section 49-3.01, "Description," of the Standard Specifications is amended by deleting the fifth paragraph.

The sixth and seventh paragraphs in Section 49-3.01, "Description," of the Standard Specifications are amended to read:

- Except for precast prestressed concrete piles in a corrosive environment, lifting anchors used in precast prestressed concrete piles shall be removed, and the holes filled in conformance with the provisions in Section 51-1.18A, "Ordinary Surface Finish."
- Lifting anchors used in precast prestressed concrete piles in a corrosive environment shall be removed to a depth of at least 25 mm below the surface of the concrete, and the resulting hole shall be filled with epoxy adhesive before the piles are delivered to the job site. The epoxy adhesive shall conform to the provisions in Sections 95-1, "General," and 95-2.01, "Binder (Adhesive), Epoxy Resin Base (State Specification 8040-03)."

The first and second paragraphs in Section 49-4.01, "Description," of the Standard Specifications are amended to read:

- Cast-in-place concrete piles shall consist of one of the following:

  A. Steel shells driven permanently to the required nominal resistance and penetration and filled with concrete.
  B. Steel casings installed permanently to the required penetration and filled with concrete.
  C. Drilled holes filled with concrete.
  D. Rock sockets filled with concrete.

- The drilling of holes shall conform to the provisions in these specifications. Concrete filling for cast-in-place concrete piles is designated by compressive strength and shall have a minimum 28-day compressive strength of 25 MPa. At the option of the Contractor, the combined aggregate grading for the concrete shall be either the 25-mm maximum grading, the 12.5-mm maximum grading, or the 9.5-mm maximum grading. Concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," and Section 51, "Concrete Structures." Reinforcement shall conform to the provisions in Section 52, "Reinforcement."

The fourth paragraph in Section 49-4.03, "Drilled Holes," of the Standard Specifications is amended to read:

• After placing reinforcement and prior to placing concrete in the drilled hole, if caving occurs or deteriorated foundation material accumulates on the bottom of the hole, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

The first and second paragraphs in Section 49-4.04, "Steel Shells," of the Standard Specifications are amended to read:

• Steel shells shall be sufficiently watertight to exclude water during the placing of concrete. The shells may be cylindrical or tapered, step-tapered, or a combination of either, with cylindrical sections.

The first paragraph in Section 49-4.05, "Inspection," of the Standard Specifications is amended to read:

• After being driven and prior to placing reinforcement and concrete therein, the steel shells shall be examined for collapse or reduced diameter at any point. Any shell which is improperly driven or broken or shows partial collapse to such an extent as to materially decrease its nominal resistance will be rejected. Rejected shells shall be removed and replaced, or a new shell shall be driven adjacent to the rejected shell. Rejected shells which cannot be removed shall be filled with concrete by the Contractor at the Contractor's expense. When a new shell is driven to replace a rejected shell, the Contractor, at the Contractor's expense, shall enlarge the footing as determined necessary by the Engineer.

The third paragraph in Section 49-5.01, "Description," of the Standard Specifications is amended to read:

• Steel pipe piles shall conform to the following requirements:

1. Steel pipe piles less than 360 mm in diameter shall conform to the requirements in ASTM Designation: A 252, Grade 2 or 3.
2. Steel pipe piles 360 mm and greater in diameter shall conform to the requirements in ASTM Designation: A 252, Grade 3.
3. Steel pipe piles shall be of the nominal diameter and nominal wall thickness shown on the plans or specified in the special provisions.
4. The carbon equivalency (CE) of steel for steel pipe piles, as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.
5. The sulfur content of steel for steel pipe piles shall not exceed 0.05-percent.
6. Seams in steel pipe piles shall be complete penetration welds.

The first paragraph in Section 49-6.01, "Measurement," of the Standard Specifications is amended to read:

• The length of timber, steel, and precast prestressed concrete piles, and of cast-in-place concrete piles consisting of driven shells filled with concrete, shall be the greater of the following:

A. The total length in place in the completed work, measured along the longest side, from the tip of the pile to the plane of pile cut-off.
B. The length measured along the longest side, from the tip elevation shown on the plans or the tip elevation ordered by the Engineer, to the plane of pile cut-off.

The third paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read:

• The contract price paid per meter for cast-in-drilled-hole concrete piling shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in drilling holes, disposing of material resulting from drilling holes, temporarily casing holes and removing water when necessary, furnishing and placing concrete and reinforcement, and constructing reinforced concrete extensions, complete in place, to the required penetration, as shown on the plans, as specified in these specifications and in the special provisions, and as directed by the Engineer.

The seventh paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read

• The contract unit price paid for drive pile shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in driving timber, concrete and steel piles, driving steel shells for cast-in-place concrete piles, placing filling materials for cast-in-place concrete piles and cutting off piles, all complete in

place to the required nominal resistance and penetration as shown on the plans and as specified in these specifications and the special provisions, and as directed by the Engineer.

The ninth paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read:

- Full compensation for all jetting, drilling, providing special driving tips or heavier sections for steel piles or shells, or other work necessary to obtain the specified penetration and nominal resistance of the piles, for predrilling holes through embankment and filling the space remaining around the pile with sand or pea gravel, for disposing of material resulting from jetting, drilling or predrilling holes, and for all excavation and backfill involved in constructing concrete extensions as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer shall be considered as included in the contract unit price paid for drive pile or in the contract price paid per meter for cast-in-drilled-hole concrete piling, and no additional compensation will be allowed therefor.

Section 49-6.02, "Payment," of the Standard Specifications is amended by adding the following paragraphs:

Full compensation for furnishing and placing additional testing reinforcement, for load test anchorages, and for cutting off test piles, shall be considered as included in the contract price paid for piling of the type or class shown in the Engineer's Estimate, and no additional compensation will be allowed.

No additional compensation or extension of time will be made for additional foundation investigation, installation and testing of indicator piling, cutting off piling and restoring the foundation investigation and indicator pile sites, and review of request by the Engineer

## SECTION 50: PRESTRESSING CONCRETE

Issue Date: November 18, 2002

Section 50-1.02, "Drawings," of the Standard Specifications is amended by adding the following paragraph after the second paragraph:

- Each working drawing submittal shall consist of plans for a single bridge or portion thereof. For multi-frame bridges, each frame shall require a separate working drawing submittal.

Section 50-1.05, "Prestressing Steel," of the Standard Specifications is amended to read:

- Prestressing steel shall be high-tensile wire conforming to the requirements in ASTM Designation: A 421, including Supplement I; high-tensile seven-wire strand conforming to the requirements in ASTM Designation: A 416; or uncoated high-strength steel bars conforming to the requirements in ASTM Designation: A 722, including all supplementary requirements. The maximum mass requirement of ASTM Designation: A 722 will not apply.
- In addition to the requirements of ASTM Designation: A 722, for deformed bars, the reduction of area shall be determined from a bar from which the deformations have been removed. The bar shall be machined no more than necessary to remove the deformations over a length of 300 mm, and reduction will be based on the area of the machined portion.
- In addition to the requirements specified herein, epoxy-coated seven-wire prestressing steel strand shall be grit impregnated and filled in conformance with the requirements in ASTM Designation: A 882/A 882M, including Supplement I, and the following:

A. The coating material shall be on the Department's list of approved coating materials for epoxy-coated strand, available from the Transportation Laboratory.
B. The film thickness of the coating after curing shall be 381 µm to 1143 µm.
C. Prior to coating the strand, the Contractor shall furnish to the Transportation Laboratory a representative 230-g sample from each batch of epoxy coating material to be used. Each sample shall be packaged in an airtight container identified with the manufacturer's name and batch number.
D. Prior to use of the epoxy-coated strand in the work, written certifications referenced in ASTM Designation: A 882/A 882M, including a representative load-elongation curve for each size and grade of strand to be used and a copy of the quality control tests performed by the manufacturer, shall be furnished to the Engineer.
E. In addition to the requirements in Section 50-1.10, "Samples for Testing," four 1.5-m long samples of coated strand and one 1.5-m long sample of uncoated strand of each size and reel shall be furnished to the Engineer for testing. These samples, as selected by the Engineer, shall be representative of the material to be used in the work.

F. Epoxy-coated strand shall be cut using an abrasive saw.

G. All visible damage to coatings caused by shipping and handling, or during installation, including cut ends, shall be repaired in conformance with the requirements in ASTM Designation: A 882/A 882M. The patching material shall be furnished by the manufacturer of the epoxy powder and shall be applied in conformance with the manufacturer's written recommendations. The patching material shall be compatible with the original epoxy coating material and shall be inert in concrete.

- All bars in any individual member shall be of the same grade, unless otherwise permitted by the Engineer.
- When bars are to be extended by the use of couplers, the assembled units shall have a tensile strength of not less than the manufacturer's minimum guaranteed ultimate tensile strength of the bars. Failure of any one sample to meet this requirement will be cause for rejection of the heat of bars and lot of couplers. The location of couplers in the member shall be subject to approval by the Engineer.
- Wires shall be straightened if necessary to produce equal stress in all wires or wire groups or parallel lay cables that are to be stressed simultaneously or when necessary to ensure proper positioning in the ducts.
- Where wires are to be button-headed, the buttons shall be cold formed symmetrically about the axes of the wires. The buttons shall develop the minimum guaranteed ultimate tensile strength of the wire. No cold forming process shall be used that causes indentations in the wire. Buttonheads shall not contain wide open splits, more than 2 splits per head, or splits not parallel with the axis of the wire.
- Prestressing steel shall be protected against physical damage and rust or other results of corrosion at all times from manufacture to grouting or encasing in concrete. Prestressing steel that has sustained physical damage at any time shall be rejected. The development of visible rust or other results of corrosion shall be cause for rejection, when ordered by the Engineer.
- Epoxy-coated prestressing steel strand shall be covered with an opaque polyethylene sheeting or other suitable protective material to protect the strand from exposure to sunlight, salt spray, and weather. For stacked coils, the protective covering shall be draped around the perimeter of the stack. The covering shall be adequately secured; however, it should allow for air circulation around the strand to prevent condensation under the covering. Epoxy-coated strand shall not be stored within 300 m of ocean or tidal water for more than 2 months.
- Prestressing steel shall be packaged in containers or shipping forms for the protection of the steel against physical damage and corrosion during shipping and storage. Except for epoxy-coated strand, a corrosion inhibitor which prevents rust or other results of corrosion, shall be placed in the package or form, or shall be incorporated in a corrosion inhibitor carrier type packaging material, or when permitted by the Engineer, may be applied directly to the steel. The corrosion inhibitor shall have no deleterious effect on the steel or concrete or bond strength of steel to concrete. Packaging or forms damaged from any cause shall be immediately replaced or restored to original condition.
- The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the type of corrosion inhibitor used, including the date packaged.
- Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, and which is not epoxy-coated, shall be continuously protected against rust or other results of corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions specified herein.
- When steam curing is used, prestressing steel for post-tensioning shall not be installed until the steam curing is completed.
- Water used for flushing ducts shall contain either quick lime (calcium oxide) or slaked lime (calcium hydroxide) in the amount of 0.01-kg/L. Compressed air used to blow out ducts shall be oil free.
- When prestressing steel for post-tensioning is installed in the ducts after completion of concrete curing, and if stressing and grouting are completed within 10 days after the installation of the prestressing steel, rust which may form during those 10 days will not be cause for rejection of the steel. Prestressing steel installed, tensioned, and grouted in this manner, all within 10 days, will not require the use of a corrosion inhibitor in the duct following installation of the prestressing steel. Prestressing steel installed as above but not grouted within 10 days shall be subject to all the requirements in this section pertaining to corrosion protection and rejection because of rust. The requirements in this section pertaining to tensioning and grouting within 10 days shall not apply to epoxy-coated prestressing steel strand.
- Any time prestressing steel for pretensioning is placed in the stressing bed and is exposed to the elements for more than 36 hours prior to encasement in concrete, adequate measures shall be taken by the Contractor, as approved by the Engineer, to protect the steel from contamination or corrosion.
- After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel. Whenever electric welding is performed on or near members containing prestressing steel, the welding ground shall be attached directly to the steel being welded.
- Pretensioned prestressing steel shall be cut off flush with the end of the member. For epoxy-coated prestressing steel, only abrasive saws shall be used to cut the steel. The exposed ends of the prestressing steel and a 25-mm strip of adjoining concrete shall be cleaned and painted. Cleaning shall be by wire brushing or abrasive blast cleaning to remove all

dirt and residue on the metal or concrete surfaces. Immediately after cleaning, the surfaces shall be covered with one application of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint," except that 2 applications shall be applied to surfaces which will not be covered by concrete or mortar. Aerosol cans shall not be used. The paint shall be thoroughly mixed at the time of application and shall be worked into any voids in the prestressing tendons.

The thirteenth paragraph in Section 50-1.08, "Prestressing," of the Standard Specifications is amended to read:

• Prestressing steel in pretensioned members shall not be cut or released until the concrete in the member has attained a compressive strength of not less than the value shown on the plans or 28 MPa, whichever is greater. In addition to these concrete strength requirements, when epoxy-coated prestressing steel strand is used, the steel shall not be cut or released until the temperature of the concrete surrounding the strand is less than 65°C, and falling.

The fifth paragraph in Section 50-1.10, "Samples for Testing," of the Standard Specifications is amended to read:

• The following samples of materials and tendons, selected by the Engineer from the prestressing steel at the plant or jobsite, shall be furnished by the Contractor to the Engineer well in advance of anticipated use:

A. For wire or bars, one 2-m long sample and for strand, one 1.5-m long sample, of each size shall be furnished for each heat or reel.
B. For epoxy-coated strand, one 1.5-m long sample of uncoated strand of each size shall be furnished for each reel.
C. If the prestressing tendon is a bar, one 2-m long sample shall be furnished and in addition, if couplers are to be used with the bar, two 1.25-m long samples of bar, equipped with one coupler and fabricated to fit the coupler, shall be furnished.

The second paragraph in Section 50-1.11, "Payment," of the Standard Specifications is amended to read:

• The contract lump sum prices paid for prestressing cast-in-place concrete of the types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing, placing, and tensioning the prestressing steel in cast-in-place concrete structures, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

## SECTION 51: CONCRETE STRUCTURES

Issue Date: January 28, 2005

The eleventh paragraph in Section 51-1.05, "Forms," of the Standard Specifications is amended to read:

• Form panels for exposed surfaces shall be furnished and placed in uniform widths of not less than 0.9-m and in uniform lengths of not less than 1.8 m, except at the end of continuously formed surfaces where the final panel length required is less than 1.8 m. Where the width of the member formed is less than 0.9-m, the width of the panels shall be not less than the width of the member. Panels shall be arranged in symmetrical patterns conforming to the general lines of the structure. Except when otherwise provided herein or shown on the plans, panels for vertical surfaces shall be placed with the long dimension horizontal and with horizontal joints level and continuous. Form panels for curved surfaces of columns shall be continuous for a minimum of one quarter of the circumference, or 1.8 m. For walls with sloping footings which do not abut other walls, panels may be placed with the long dimension parallel to the footing. Form panels on each side of the panel joint shall be precisely aligned, by means of supports or fasteners common to both panels, to result in a continuous unbroken concrete plane surface. When prefabricated soffit panels are used, form filler panels joining prefabricated panels shall have a uniform minimum width of 0.3-m and shall produce a smooth uniform surface with consistent longitudinal joint lines between the prefabricated panels.

The first and second paragraph in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications are amended to read:

• The Contractor shall submit to the Engineer working drawings and design calculations for falsework proposed for use at bridges. For bridges where the height of any portion of the falsework, as measured from the ground line to the soffit of the superstructure, exceeds 4.25 m; or where any individual falsework clear span length exceeds 4.85 m; or where provision for vehicular, pedestrian, or railroad traffic through the falsework is made; the drawings shall be signed by an engineer who is

registered as a Civil Engineer in the State of California. Six sets of the working drawings and 2 copies of the design calculations shall be furnished. Additional working drawings and design calculations shall be submitted to the Engineer when specified in "Railroad Relations and Insurance" of the special provisions.

- The falsework drawings shall include details of the falsework erection and removal operations showing the methods and sequences of erection and removal and the equipment to be used. The details of the falsework erection and removal operations shall demonstrate the stability of all or any portions of the falsework during all stages of the erection and removal operations.

The seventh paragraph in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications is amended to read:

- In the event that several falsework plans are submitted simultaneously, or an additional plan is submitted for review before the review of a previously submitted plan has been completed, the Contractor shall designate the sequence in which the plans are to be reviewed. In such event, the time to be provided for the review of any plan in the sequence shall be not less than the review time specified above for that plan, plus 2 weeks for each plan of higher priority which is still under review. A falsework plan submittal shall consist of plans for a single bridge or portion thereof. For multi-frame bridges, each frame shall require a separate falsework plan submittal.

Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications is amended by adding the following paragraphs:

- If structural composite lumber is proposed for use, the falsework drawings shall clearly identify the structural composite lumber members by grade (E value), species, and type. The Contractor shall provide technical data from the manufacturer showing the tabulated working stress values of the composite lumber. The Contractor shall furnish a certificate of compliance as specified in Section 6-1.07, "Certificates of Compliance," for each delivery of structural composite lumber to the project site.
- For falsework piles with a calculated loading capacity greater than 900 kN, the falsework piles shall be designed by an engineer who is registered as either a Civil Engineer or a Geotechnical Engineer in the State of California, and the calculations shall be submitted to the Engineer.

The first paragraph in Section 51-1.06A(1), "Design Loads," of the Standard Specifications is amended to read:

- The design load for falsework shall consist of the sum of dead and live vertical loads, and an assumed horizontal load. The minimum total design load for any falsework, including members that support walkways, shall be not less than 4800 $N/m^2$ for the combined live and dead load regardless of slab thickness.

The eighth paragraph in Section 51-1.06A(1), "Design Loads," of the Standard Specifications is amended to read:

- In addition to the minimum requirements specified in this Section 51-1.06A, falsework for box girder structures with internal falsework bracing systems using flexible members capable of withstanding tensile forces only, shall be designed to include the vertical effects caused by the elongation of the flexible member and the design horizontal load combined with the dead and live loads imposed by concrete placement for the girder stems and connected bottom slabs. Falsework comprised of individual steel towers with bracing systems using flexible members capable of withstanding tensile forces only to resist overturning, shall be exempt from these additional requirements.

The third paragraph in Section 51-1.06B, "Falsework Construction," of the Standard Specifications is amended to read:

- When falsework is supported on piles, the piles shall be driven and the actual nominal resistance assessed in conformance with the provisions in Section 49, "Piling."

Section 51-1.06B, "Falsework Construction," of the Standard Specifications is amended by adding the following paragraphs:

- For falsework piles with a calculated nominal resistance greater than 1800 kN, the Contractor shall conduct dynamic monitoring of pile driving and generate field acceptance criteria based on a wave equation analysis. These analyses shall be signed by an engineer who is registered as a Civil Engineer in the State of California and submitted to the Engineer prior to completion of falsework erection.

• Prior to the placement of falsework members above the stringers, the final bracing system for the falsework shall be installed.

Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended by adding the following paragraph:

• The falsework removal operation shall be conducted in such a manner that any portion of the falsework not yet removed remains in a stable condition at all times.

The sixth paragraph in Section 51-1.09, "Placing Concrete," of the Standard Specifications is amended to read:

• Vibrators used to consolidate concrete containing epoxy-coated bar reinforcement or epoxy-coated prestressing steel shall have a resilient covering to prevent damage to the epoxy-coating on the reinforcement or prestressing steel.

The third sentence of the fourth paragraph in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications is amended to read:

Surfaces of expanded polystyrene against which concrete is placed shall be faced with hardboard.

Section 51-1.12F, "Sealed Joints," of the Standard Specifications is amended by adding the following paragraph:

• The opening of the joints at the time of placing shall be that shown on the plans adjusted for temperature. Care shall be taken to avoid impairment of the clearance in any manner.

The first paragraph in Section 51-1.12F, "Sealed Joints," of the Standard Specifications is amended to read:

• Where shown on the plans, joints in structures shall be sealed with joint seals, joint seal assemblies, or seismic joints in conformance with the details shown on the plans, the provisions in these specifications, and the special provisions.

The fourth paragraph in Section 51-1.12F, "Sealed Joints," of the Standard Specifications is amended to read:

• Joint seal assemblies and seismic joints shall consist of metal or metal and elastomeric assemblies which are anchored or cast into a recess in the concrete over the joint. Strip seal joint seal assemblies consist of only one joint cell. Modular unit joint seal assemblies consist of more than one joint cell.

The fifth paragraph in Section 51-1.12F, "Sealed Joints," of the Standard Specifications is amended to read:

• The Movement Rating (MR) shall be measured normal to the longitudinal axis of the joint. The type of seal to be used for the MR shown on the plans shall be as follows:

| Movement Rating (MR) | Seal Type |
|---|---|
| MR ≤ 15 mm | Type A or Type B |
| 15 mm < MR ≤ 30 mm | Type A (silicone only) or Type B |
| 30 mm < MR ≤ 50 mm | Type B |
| 50 mm < MR ≤ 100 mm | Joint Seal Assembly (Strip Seal) |
| MR > 100 mm | Joint Seal Assembly (Modular Unit) or Seismic Joint |

The second paragraph in Section 51-1.12F(3)(b), "Type B Seal," of the Standard Specifications is amended to read:

• The preformed elastomeric joint seal shall conform to the requirements in ASTM Designation: D 2628 and the following:

A. The seal shall consist of a multi-channel, nonporous, homogeneous material furnished in a finished extruded form.
B. The minimum depth of the seal, measured at the contact surface, shall be at least 95 percent of the minimum uncompressed width of the seal as designated by the manufacturer.
C. When tested in conformance with the requirements in California Test 673 for Type B seals, joint seals shall provide a Movement Rating (MR) of not less than that shown on the plans.

D. The top and bottom edges of the joint seal shall maintain continuous contact with the sides of the groove over the entire range of joint movement.
E. The seal shall be furnished full length for each joint with no more than one shop splice in any 18-m length of seal.
F. The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seals in the joints.
G. Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.
H. At all open ends of the seal that would admit water or debris, each cell shall be filled to a depth of 80 mm with commercial quality open cell polyurethane foam, or closed by other means subject to approval by the Engineer.

Section 51-1.12F(3)(c), "Joint Seal Assemblies," of the Standard Specifications is amended to read:

**(c) Joint Seal Assemblies and Seismic Joints**

• Joint seal assemblies and seismic joints shall be furnished and installed in joints in bridge decks as shown on the plans and as specified in the special provisions.

The eighth paragraph in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications is amended to read:

• The elastomer, as determined from test specimens, shall conform to the following:

| Test | ASTM Designation | Requirement |
|---|---|---|
| Tensile strength, MPa | D 412 | 15.5 Min. |
| Elongation at break, percent | D 412 | 350 Min. |
| Compression set, 22 h at 70°C, percent | D 395 (Method B) | 25 Max. |
| Tear strength, kN/m | D 624 (Die C) | 31.5 Min. |
| Hardness (Type A) | D 2240 with 2 kg. mass | 55 ±5 |
| Ozone resistance 20% strain, 100 h at 40°C ±2°C | D 1149 (except 100 ±20 parts per 100 000 000) | No cracks |
| Instantaneous thermal stiffening at -40°C | D 1043 | Shall not exceed 4 times the stiffness measured at 23°C |
| Low temperature brittleness at -40°C | D 746 (Procedure B) | Pass |

The table in the ninth paragraph of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads," of the Standard Specifications is amended to read:

| | |
|---|---|
| Tensile strength, percent | -15 |
| Elongation at break, percent | -40; but not less than 300% total elongation of the material |
| Hardness, points | +10 |

The first paragraph in Section 51-1.12H(2), "Steel Reinforced Elastomeric Bearings," of the Standard Specifications is amended to read:

• Steel reinforced elastomeric bearings shall conform to the requirements for steel-laminated elastomeric bearings in ASTM Designation: D 4014 and the following:

A. The bearings shall consist of alternating steel laminates and internal elastomer laminates with top and bottom elastomer covers. Steel laminates shall have a nominal thickness of 1.9 mm (14 gage). Internal elastomer laminates shall have a thickness of 12 mm, and top and bottom elastomer covers shall each have a thickness of 6 mm. The combined thickness of internal elastomer laminates and top and bottom elastomer covers shall be equal to the bearing pad thickness shown on the plans. The elastomer cover to the steel laminates at the sides of the bearing shall be 3 mm. If guide pins or other devices are used to control the side cover over the steel laminates, any exposed

portions of the steel laminates shall be sealed by vulcanized patching. The length, width, or diameter of the bearings shall be as shown on the plans.

B. The total thickness of the bearings shall be equal to the thickness of elastomer laminates and covers plus the thickness of the steel laminates.

C. Elastomer for steel reinforced elastomeric bearings shall conform to the provisions for elastomer in Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearing Pads."

D. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer certifying that the bearings to be furnished conform to all of the above provisions. The Certificate of Compliance shall be supported by a certified copy of the results of tests performed by the manufacturer on the bearings.

E. One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

| Bearing Pad Thickness as Shown on the Plans | Sample Bearing |
|---|---|
| ≤ 50 mm | Smallest complete bearing shown on the plans |
| > 50 mm | * 57 ± 3 mm thick sample not less than 200 mm x 305 mm in plan and cut by the manufacturer from the center of one of the thickest complete bearings |

* The sample bearing plus remnant parts of the complete bearing shall be furnished to the Engineer.

F. A test specimen taken from the sample furnished to the Engineer will be tested in conformance with the requirements in California Test 663. Specimens tested shall show no indication of loss of bond between the elastomer and steel laminates.

The fourth paragraph in Section 51-1.14, "Waterstops," of the Standard Specifications is amended to read:

• Neoprene shall be manufactured from a vulcanized elastomeric compound containing neoprene as the sole elastomer and shall conform to the following:

| Test | ASTM Designation | Requirement |
|---|---|---|
| Tensile strength, MPa | D 412 | 13.8 Min. |
| Elongation at break, percent | D 412 | 300 Min. |
| Compression set, 22 h at 70°C, percent | D 395 (Method B) | 30 Max. |
| Tear strength, kN/m | D 624 (Die C) | 26.3 Min. |
| Hardness (Type A) | D 2240 | 55±5 |
| Ozone resistance 20% strain, 100 h at 38°C ±1°C | D 1149 (except 100± 20 parts per 100 000 000) | No cracks |
| Low temperature brittleness at -40°C | D 746 (Procedure B) | Pass |
| Flame resistance | C 542 | Must not propagate flame |
| Oil Swell, ASTM Oil #3, 70 h at 100°C, volume change, percent | D 471 | 80 Max. |
| Water absorption, immersed 7 days at 70°C, change in mass, percent | D 471 | 15 Max. |

The first sentence of the fourth paragraph in Section 51-1.17, "Finish Bridge Decks," of the Standard Specifications is amended to read:

• The smoothness of completed roadway surfaces of structures, approach slabs and the adjacent 15 m of approach pavement, and the top surfaces of concrete decks which are to be covered with another material, will be tested by the

Engineer with a bridge profilograph in conformance with the requirements in California Test 547 and the requirements herein.

Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications is amended by deleting the seventh, thirteenth and fourteenth paragraphs.

The fourteenth paragraph in Section 51-1.23, "Payment," of the Standard Specifications is amended by deleting "and injecting epoxy in cracks".

## SECTION 52: REINFORCEMENT

Issue Date: November 2, 2004

The first paragraph in Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications is amended to read:

• Reinforcing bars shall be low-alloy steel deformed bars conforming to the requirements in ASTM Designation: A 706/A 706M, except that deformed or plain billet-steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 280 or 420, may be used as reinforcement in the following 5 categories:

A. Slope and channel paving,
B. Minor structures,
C. Sign and signal foundations (pile and spread footing types),
D. Roadside rest facilities, and
E. Concrete barrier Type 50 and Type 60 series and temporary railing.

The third paragraph in Section 52-1.04, "Inspection," of the Standard Specifications is amended to read:

• A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall also be furnished for each shipment of epoxy-coated bar reinforcement or wire reinforcement certifying that the coated reinforcement conforms to the requirements in ASTM Designation: A 775/A 775M or A 884/A 884M respectively, and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement." The Certificate of Compliance shall include all of the certifications specified in ASTM Designation: A 775/A 775M or A 884/A 884M respectively.

Section 52-1.07 "Placing," of the Standard Specifications is amended by deleting item C of the third paragraph.

The eleventh paragraph in Section 52-1.07, "Placing," of the Standard Specifications is amended to read:

• Attention is directed to the provisions in Section 7-1.09, "Public Safety." Whenever a portion of an assemblage of bar reinforcing steel that is not encased in concrete exceeds 6 m in height, the Contractor shall submit to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings and design calculations for the temporary support system to be used. The working drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support system shall be designed to resist all expected loads and shall be adequate to prevent collapse or overturning of the assemblage. If the installation of forms or other work requires revisions to or temporary release of any portion of the temporary support system, the working drawings shall show the support system to be used during each phase of construction. The minimum horizontal wind load to be applied to the bar reinforcing steel assemblage, or to a combined assemblage of reinforcing steel and forms, shall be the sum of the products of the wind impact area and the applicable wind pressure value for each height zone. The wind impact area is the total projected area of the cage normal to the direction of the applied wind. Wind pressure values shall be determined from the following table:

| Height Zone (Meters above ground) | Wind Pressure Value (Pa) |
|---|---|
| 0-9.0 | 960 |
| 9.1-15.0 | 1200 |
| 15.1-30.0 | 1440 |
| Over 30 | 1675 |

Section 52-1.08 "Splicing," of the Standard Specifications is amended to read:

## 52-1.08 SPLICING

- Splices of reinforcing bars shall consist of lap splices, service splices, or ultimate butt splices.
- Splicing of reinforcing bars will not be permitted at a location designated on the plans as a "No-Splice Zone." At the option of the Contractor, reinforcing bars may be continuous at locations where splices are shown on the plans. The location of splices, except where shown on the plans, shall be determined by the Contractor using available commercial lengths where practicable.
- Unless otherwise shown on the plans, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same as the length required for a lap splice in the largest bar. The minimum distance between staggered butt splices shall be 600 mm, measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

### 52-1.08A Lap Splicing Requirements

- Splices made by lapping shall consist of placing reinforcing bars in contact and wiring them together, maintaining the alignment of the bars and the minimum clearances. Should the Contractor elect to use a butt welded or mechanical splice at a location not designated on the plans as requiring a service or ultimate butt splice, this splice shall conform to the testing requirements for service splice.
- Reinforcing bars shall not be spliced by lapping at locations where the concrete section is not sufficient to provide a minimum clear distance of 50 mm between the splice and the nearest adjacent bar. The clearance to the surface of the concrete specified in Section 52-1.07, "Placing," shall not be reduced.
- Reinforcing bars Nos. 43 and 57 shall not be spliced by lapping.
- Where ASTM Designations: A 615/A 615M, Grade 420 or A 706/A 706M reinforcing bars are required, the length of lap splices shall be as follows: Reinforcing bars No. 25 or smaller shall be lapped at least 45 diameters of the smaller bar joined; and reinforcing bars Nos. 29, 32, and 36 shall be lapped at least 60 diameters of the smaller bar joined, except when otherwise shown on the plans.
- Where ASTM Designation: A 615/A 615M, Grade 280 reinforcing bars are permitted, the length of lap splices shall be as follows: Reinforcing bars No. 25 or smaller shall be lapped at least 30 diameters of the smaller bar joined; and reinforcing bars Nos. 29, 32, and 36 shall be lapped at least 45 diameters of the smaller bar joined, except when otherwise shown on the plans.
- Splices in bundled bars shall conform to the following:

A In bundles of 2 bars, the length of the lap splice shall be the same as the length of a single bar lap splice.
B. In bundles of 3 bars, the length of the lap splice shall be 1.2 times the length of a single bar lap splice.

- Welded wire fabric shall be lapped such that the overlap between the outermost cross wires is not less than the larger of:

A. 150 mm,
B. The spacing of the cross wires plus 50 mm, or
C. The numerical value of the longitudinal wire size (MW-Size Number) times 370 divided by the spacing of the longitudinal wires in millimeters.

### 52-1.08B Service Splicing and Ultimate Butt Splicing Requirements

- Service splices and ultimate butt splices shall be either butt welded or mechanical splices, shall be used at the locations shown on the plans, and shall conform to the requirements of these specifications and the special provisions.

#### 52-1.08B(1) Mechanical Splices

- Mechanical splices to be used in the work shall be on the Department's current prequalified list before use. The prequalified list can be obtained from the Department's internet site listed in the special provisions or by contacting the Transportation Laboratory directly.
- When tested in conformance with the requirements in California Test 670, the total slip shall not exceed the values listed in the following table:

| Reinforcing Bar Number | Total Slip (μm) |
|---|---|
| 13 | 250 |
| 16 | 250 |
| 19 | 250 |
| 22 | 350 |
| 25 | 350 |
| 29 | 350 |
| 32 | 450 |
| 36 | 450 |
| 43 | 600 |
| 57 | 750 |

- Slip requirements shall not apply to mechanical lap splices, splices that are welded, or splices that are used on hoops.
- Splicing procedures shall be in conformance with the manufacturer's recommendations, except as modified in this section. Splices shall be made using the manufacturer's standard equipment, jigs, clamps, and other required accessories.
- Splice devices shall have a clear coverage of not less than 40 mm measured from the surface of the concrete to the outside of the splice device. Stirrups, ties, and other reinforcement shall be adjusted or relocated, and additional reinforcement shall be placed, if necessary, to provide the specified clear coverage to reinforcement.
- The Contractor shall furnish the following information for each shipment of splice material in conformance with the provisions in Section 6-1.07, "Certificates of Compliance:"

A. The type or series identification of the splice material including tracking information for traceability.
B. The bar grade and size number to be spliced.
C. A copy of the manufacturer's product literature giving complete data on the splice material and installation procedures.
D. A statement that the splicing systems and materials used in conformance with the manufacturer's installation procedures will develop the required tensile strengths, based on the nominal bar area, and will conform to the total slip requirements and the other requirements in these specifications.
E. A statement that the splice material conforms to the type of mechanical splice in the Department's current prequalified list.

**52-1.08B(2) Butt Welded Splices**

- Except for resistance butt welds, butt welded splices of reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D 1.4, and these specifications.
- Welders and welding procedures shall be qualified in conformance with the requirements in AWS D 1.4.
- Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.
- Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 4 mm in convexity.
- Electrodes used for welding shall meet the minimum Charpy V-notch impact requirement of 27°J at –20°C.
- For welding of bars conforming to the requirements of ASTM Designation: A 615/A 615M, Grade 280 or Grade 420, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D 1.4 are superseded by the following:

The minimum preheat and interpass temperatures shall be 200°C for Grade 280 bars and 300°C for Grade 420 bars. Immediately after completing the welding, at least 150 mm of the bar on each side of the splice shall be covered by an insulated wrapping to control the rate of cooling. The insulated wrapping shall remain in place until the bar has cooled below 90°C.

- When welding different grades of reinforcing bars, the electrode shall conform to Grade 280 bar requirements and the preheat shall conform to the Grade 420 bar requirements.
- In the event that any of the specified preheat, interpass, and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.
- Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

- Reinforcing bars shall not be direct butt spliced by thermite welding.
- Procedures to be used in making welded splices in reinforcing bars, and welders employed to make splices in reinforcing bars, shall be qualified by tests performed by the Contractor on sample splices of the type to be used, before making splices to be used in the work.

**52-1.08B(3) Resistance Butt Welds**

- Shop produced resistance butt welds shall be produced by a fabricator who is approved by the Transportation Laboratory. The list of approved fabricators can be obtained from the Department's internet site or by contacting the Transportation Laboratory directly.
- Before manufacturing hoops using resistance butt welding, the Contractor shall submit to the Engineer the manufacturer's Quality Control (QC) manual for the fabrication of hoops. As a minimum, the QC manual shall include the following:

A. The pre-production procedures for the qualification of material and equipment.
B. The methods and frequencies for performing QC procedures during production.
C. The calibration procedures and calibration frequency for all equipment.
D. The welding procedure specification (WPS) for resistance welding.
E. The method for identifying and tracking lots.

**52-1.08C Service Splice and Ultimate Butt Splice Testing Requirements**

- The Contractor shall designate in writing a splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for 1) the quality of all service and ultimate butt splicing including the inspection of materials and workmanship performed by the Contractor and all subcontractors; and 2) submitting, receiving, and approving all correspondence, required submittals, and reports regarding service and ultimate splicing to and from the Engineer.
- The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.
- Testing on prequalification and production sample splices shall be performed at the Contractor's expense, at an independent qualified testing laboratory. The laboratory shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

A. Proper facilities, including a tensile testing machine capable of breaking the largest size of reinforcing bar to be tested with minimum lengths as shown in this section.
B. A device for measuring the total slip of the reinforcing bars across the splice to the nearest 25 µm, that, when placed parallel to the longitudinal axis of the bar is able to simultaneously measure movement across the splice at 2 locations 180 degrees apart.
C. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 370 and California Test 670.
D. A record of annual calibration of testing equipment performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology, and 2) a formal reporting procedure, including published test forms.

- The Contractor shall provide samples for quality assurance testing in conformance with the provisions in these specifications and the special provisions.
- Prequalification and production sample splices shall be 1) a minimum length of 1.5 meters for reinforcing bars No. 25 or smaller, and 2 meters for reinforcing bars No. 29 or larger, with the splice located at mid-point; and 2) suitably identified before shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Splices that show signs of tampering will be rejected.
- Shorter length sample splice bars may be furnished if approved in writing by the Engineer.
- The Contractor shall ensure that sample splices are properly secured and transported to the testing laboratory in such a manner that no alterations to the physical conditions occur during transportation. Sample splices shall be tested in the same condition as received. No modifications to the sample splices shall be made before testing.
- Each set or sample splice, as defined herein, shall be identified as representing either a prequalification or production test sample splice.
- For the purpose of production testing, a lot of either service splices or ultimate butt splices is defined as 1) 150, or fraction thereof, of the same type of mechanical splices used for each bar size and each bar deformation pattern that is used in the work, or 2) 150, or fraction thereof, of complete joint penetration butt welded splices or resistance butt welded splices for

each bar size used in the work. If different diameters of hoop reinforcement are shown on the plans, separate lots shall be used for each different hoop diameter.

• Whenever a lot of splices is rejected, the rejected lot and subsequent lots of splices shall not be used in the work until 1) the QCM performs a complete review of the Contractor's quality control process for these splices, 2) a written report is submitted to the Engineer describing the cause of failure for the splices in this lot and provisions for preventing similar failures in future lots, and 3) the Engineer has provided the Contractor with written notification that the report is acceptable. The Engineer shall have 3 working days after receipt of the report to provide notification to the Contractor. In the event the Engineer fails to provide notification within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in providing notification, the Contractor will be compensated for any resulting loss, and an extension of time will be granted in the same manner as provided for in Section 8-1.09, "Right of Way Delays."

**52-1.08C(1) Splice Prequalification Report**

• Before using any service splices or ultimate butt splices in the work, the Contractor shall submit a Splice Prequalification Report. The report shall include splice material information, names of the operators who will be performing the splicing, and descriptions of the positions, locations, equipment, and procedures that will be used in the work.

• The Splice Prequalification Report shall also include certifications from the fabricator for prequalifications of operators and procedures based on sample tests performed no more than 2 years before submitting the report. Each operator shall be certified by performing 2 sample splices for each bar size of each splice type that the operator will be performing in the work. For deformation-dependent types of splice devices, each operator shall be certified by performing 2 additional samples for each bar size and deformation pattern that will be used in the work.

• Prequalification sample splices shall be tested by an independent qualified testing laboratory and shall conform to the appropriate production test criteria and slip requirements specified herein. When epoxy-coated reinforcement is required, resistance butt welded sample splices shall have the weld flash removed by the same procedure as will be used in the work, before coating and testing. The Splice Prequalification Report shall include the certified test results for all prequalification sample splices.

• The QCM shall review and approve the Splice Prequalification Report before submitting it to the Engineer for approval. The Contractor shall allow 2 weeks for the review and approval of a complete report before performing any service splicing or ultimate butt splicing in the work. In the event the Engineer fails to complete the review within the time allowed, and in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays."

**52-1.08C(2) Service Splice Test Criteria**

• Service production and quality assurance sample splices shall be tensile tested in conformance with the requirements in ASTM Designation: A 370 and California Test 670 and shall develop a minimum tensile strength of not less than 550 MPa.

**52-1.08C(2)(a) Production Test Requirements for Service Splices**

• Production tests shall be performed by the Contractor's independent laboratory for all service splices used in the work. A production test shall consist of testing 4 sample splices prepared for each lot of completed splices. The samples shall be prepared by the Contractor using the same splice material, position, operators, location, and equipment, and following the same procedure as used in the work.

• At least one week before testing, the Contractor shall notify the Engineer in writing of the date when and the location where the testing of the samples will be performed.

• The 4 samples from each production test shall be securely bundled together and identified with a completed sample identification card before shipment to the independent laboratory. The card will be furnished by the Engineer. Bundles of samples containing fewer than 4 samples of splices shall not be tested.

• Before performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the requirements for total slip. Should this sample not meet the total slip requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. Should any of the 3 remaining samples not conform to the total slip requirements, all splices in the lot represented by this production test will be rejected.

• If 3 or more sample splices from a production test conform to the provisions in this Section 52-1.08C(2),"Service Splice Test Criteria," all splices in the lot represented by this production test will be considered acceptable, provided each of the 4 samples develop a minimum tensile strength of not less than 420 MPa.

• Should only 2 sample splices from a production test conform to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," one additional production test shall be performed on the same lot of splices. This additional production test shall consist of testing 4 samples splices that have been randomly selected by the Engineer and removed by the

Contractor from the actual completed lot of splices. Should any of the 4 splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.

- If only one sample splice from a production test conforms to the provisions in this Section 52-1.08C(2), "Service Splice Test Criteria," all splices in the lot represented by this production test will be rejected.
- If a production test for a lot fails, the Contractor shall repair or replace all reinforcing bars from which sample splices were removed before the Engineer selects additional splices from this lot for further testing.

**52-1.08C(2)(b) Quality Assurance Test Requirements for Service Splices**

- For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 subsequent production tests, or portion thereof, the Contractor shall concurrently prepare 4 additional service quality assurance sample splices. These service quality assurance sample splices shall be prepared in the same manner as specified herein for service production sample splices.
- These 4 additional quality assurance sample splices shall be shipped to the Transportation Laboratory for quality assurance testing. The 4 sample splices shall be securely bundled together and identified by location and contract number with weatherproof markings before shipment. Bundles containing fewer than 4 samples of splices will not be tested. Sample splices not accompanied by the supporting documentation required in Section 52-1.08B(1), for mechanical splices, or in Section 52-1.08B(3), for resistance butt welds, will not be tested.
- Quality assurance testing will be performed in conformance with the requirements for service production sample splices in Section 52-1.08C(2)(a), "Production Test Requirements for Service Splices."

**52-1.08C(3) Ultimate Butt Splice Test Criteria**

- Ultimate production and quality assurance sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370 and California Test 670.
- A minimum of one control bar shall be removed from the same bar as, and adjacent to, all ultimate production, and quality assurance sample splices. Control bars shall be 1) a minimum length of one meter for reinforcing bars No. 25 or smaller and 1.5 meters for reinforcing bars No. 29 or larger, and 2) suitably identified before shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. The portion of adjacent bar remaining in the work shall also be identified with weatherproof markings that correspond to its adjacent control bar.
- Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing a prequalification, production, or quality assurance sample splice.
- The portion of hoop reinforcing bar, removed to obtain a sample splice and control bar, shall be replaced using a prequalified ultimate mechanical butt splice, or the hoop shall be replaced in kind.
- Reinforcing bars, other than hoops, from which sample splices are removed, shall be repaired using ultimate mechanical butt splices conforming to the provisions in Section 52-1.08C(1), "Splice Prequalification Report," or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in any "No Splice Zone" shown on the plans.
- Ultimate production and quality assurance sample splices shall rupture in the reinforcing bar either: 1) outside of the affected zone or 2) within the affected zone, provided that the sample splice has achieved at least 95 percent of the ultimate tensile strength of the control bar associated with the sample splice. In addition, necking of the bar, as defined in California Test 670, shall be evident at rupture regardless of whether the bar breaks inside or outside the affected zone.
- The affected zone is the portion of the reinforcing bar where any properties of the bar, including the physical, metallurgical, or material characteristics, have been altered by fabrication or installation of the splice.
- The ultimate tensile strength shall be determined for all control bars by tensile testing the bars to rupture, regardless of where each sample splice ruptures. If 2 control bars are tested for one sample splice, the bar with the lower ultimate tensile strength shall be considered the control bar.

**52-1.08C(3)(a) Production Test Requirements for Ultimate Butt Splices**

- Production tests shall be performed for all ultimate butt splices used in the work. A production test shall consist of testing 4 sets of sample splices and control bars removed from each lot of completed splices, except when quality assurance tests are performed.
- After the splices in a lot have been completed, and the bars have been epoxy-coated when required, the QCM shall notify the Engineer in writing that the splices in this lot conform to the specifications and are ready for testing. Except for hoops, sample splices will be selected by the Engineer at the job site. Sample splices for hoops will be selected by the Engineer either at the job site or a fabrication facility.
- After notification has been received, the Engineer will randomly select the 4 sample splices to be removed from the lot and place tamper-proof markings or seals on them. The Contractor shall select the adjacent control bar for each sample splice bar, and the Engineer will place tamper-proof markings or seals on them. These ultimate production sample splices and control bars shall be removed by the Contractor, and tested by an independent qualified testing laboratory.

- At least one week before testing, the Contractor shall notify the Engineer in writing of the date when and the location where the testing of the samples will be performed.
- A sample splice or control bar from any set will be rejected if a tamper-proof marking or seal is disturbed before testing.
- The 4 sets from each production test shall be securely bundled together and identified with a completed sample identification card before shipment to the independent laboratory. The card will be furnished by the Engineer. Bundles of samples containing fewer than 4 sets of splices shall not be tested.
- Before performing any tensile tests on production test sample splices, one of the 4 sample splices shall be tested for, and shall conform to, the requirements for total slip. Should this sample splice not meet these requirements, one retest, in which the 3 remaining sample splices are tested for total slip, will be allowed. Should any of the 3 remaining sample splices not conform to these requirements, all splices in the lot represented by this production test will be rejected.
- If 3 or more sample splices from a production test conform to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," all splices in the lot represented by this production test will be considered acceptable.
- Should only 2 sample splices from a production test conform to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," one additional production test shall be performed on the same lot of splices. Should any of the 4 sample splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.
- If only one sample splice from a production test conforms to the provisions in Section 52-1.08C(3), "Ultimate Butt Splice Test Criteria," all splices in the lot represented by this production test will be rejected.
- If a production test for a lot fails, the Contractor shall repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects additional splices from this lot for further testing.
- Production tests will not be required on repaired splices from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair. However, should an additional production test be required, the Engineer may select any repaired splice for the additional production test.

**52-1.08C(3)(b) Quality Assurance Test Requirements for Ultimate Butt Splices**

- For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 subsequent production tests, or portion thereof, the Contractor shall concurrently prepare 4 additional ultimate quality assurance sample splices along with associated control bars.
- Each time 4 additional ultimate quality assurance sample splices are prepared, 2 of these quality assurance sample splice and associated control bar sets and 2 of the production sample splice and associated control bar sets, together, shall conform to the requirements for ultimate production sample splices in Section 52-1.08C(3)(a),"Production Test Requirements for Ultimate Butt Splices."
- The 2 remaining quality assurance sample splice and associated control bar sets, along with the 2 remaining production sample splice and associated control bar sets shall be shipped to the Transportation Laboratory for quality assurance testing. The 4 sets shall be securely bundled together and identified by location and contract number with weatherproof markings before shipment. Bundles containing fewer than 4 sets will not be tested.
- Quality assurance testing will be performed in conformance with the requirements for ultimate production sample splices in Section 52-1.08C(3)(a), "Production Test Requirements for Ultimate Butt Splices."

**52-1.08C(3)(c) Nondestructive Splice Tests**

- When the specifications allow for welded sample splices to be taken from other than the completed lot of splices, the Contractor shall meet the following additional requirements.
- Except for resistance butt welded splices, radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 150 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.
- All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in conformance with the requirements in AWS D 1.4 and these specifications.
- Before radiographic examination, welds shall conform to the requirements in Section 4.4, "Quality of Welds," of AWS D 1.4.
- Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.
- Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.
- All defects shall be repaired in conformance with the requirements in AWS D 1.4.
- The Contractor shall notify the Engineer in writing 48 hours before performing any radiographic examinations.

- The radiographic procedure used shall conform to the requirements in AWS D1.1, AWS D1.4, and the following:

Two exposures shall be made for each complete joint penetration butt welded splice. For each of the 2 exposures, the radiation source shall be centered on each bar to be radiographed. The first exposure shall be made with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identified with a station mark of "0." The second exposure shall be at 90 degrees to the "0" station mark and shall be identified with a station mark of "90." When obstructions prevent a 90 degree placement of the radiation source for the second exposure, and when approved in writing by the Engineer, the source may be rotated, around the centerline of the reinforcing bar, a maximum of 25 degrees.

For field produced complete joint penetration butt welds, no more than one weld shall be radiographed during one exposure. For shop produced complete joint penetration butt welds, if more than one weld is to be radiographed during one exposure, the angle between the root line of each weld and the direction to the radiation source shall be not less than 65 degrees.

Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 4.45 mm in the greatest diagonal dimension.

The radiographic film shall be placed perpendicular to the radiation source at all times; parallel to the root line of the weld unless source placement determines that the film must be turned; and as close to the root of the weld as possible.

The minimum source to film distance shall be maintained so as to ensure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the reinforcing bars.

Penetrameters shall be placed on the source side of the bar and perpendicular to the radiation source at all times. One penetrameter shall be placed in the center of each bar to be radiographed, perpendicular to the weld root, and adjacent to the weld. Penetrameter images shall not appear in the weld area.

When radiography of more than one weld is being performed per exposure, each exposure shall have a minimum of one penetrameter per bar, or 3 penetrameters per exposure. When 3 penetrameters per exposure are used, one penetrameter shall be placed on each of the 2 outermost bars of the exposure, and the remaining penetrameter shall be placed on a centrally located bar.

An allowable weld buildup of 4 mm may be added to the total material thickness when determining the proper penetrameter selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrameter blocks shall not be used.

Penetrameters shall be sufficiently shimmed using a radiographically identical material. Penetrameter image densities shall be a minimum of 2.0 and a maximum of 3.6.

Radiographic film shall be Class 1, regardless of the size of reinforcing bars.

Radiographs shall be free of film artifacts and processing defects, including, but not limited to, streaks, scratches, pressure marks or marks made for the purpose of identifying film or welding indications.

Each splice shall be clearly identified on each radiograph and the radiograph identification and marking system shall be established between the Contractor and the Engineer before radiographic inspection begins. Film shall be identified by lead numbers only; etching, flashing or writing in identifications of any type will not be permitted. Each piece of film identification information shall be legible and shall include, as a minimum, the following information: Contractor's name, date, name of nondestructive testing firm, initials of radiographer, contract number, part number and weld number. The letter "R" and repair number shall be placed directly after the weld number to designate a radiograph of a repaired weld.

Radiographic film shall be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Sight development will not be allowed.

Processing chemistry shall be done with a consistent mixture and quality, and processing rinses and tanks shall be clean to ensure proper results. Records of all developing processes and any chemical changes to the developing processes shall be kept and furnished to the Engineer upon request. The Engineer may request, at any time, that a sheet of unexposed film be processed in the presence of the Engineer to verify processing chemical and rinse quality.

The results of all radiographic interpretations shall be recorded on a signed certification and a copy kept with the film packet.

Technique sheets prepared in conformance with the requirements in ASME Boiler and Pressure Vessels Code, Section V, Article 2 Section T-291 shall also contain the developer temperature, developing time, fixing duration and all rinse times.

**52-1.08D Reporting Test Results**

- A Production Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory performing the testing and submitted to the QCM for review and approval. The report shall be signed by an

engineer who represents the laboratory and is registered as a Civil Engineer in the State of California. The report shall include, as a minimum, the following information for each test: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, length of test specimen, physical condition of test sample splice and any associated control bar, any notable defects, total measured slip, ultimate tensile strength of each splice, and for ultimate butt splices, limits of affected zone, location of visible necking area, ultimate tensile strength and 95 percent of this ultimate tensile strength for each control bar, and a comparison between 95 percent of the ultimate tensile strength of each control bar and the ultimate tensile strength of its associated splice.

- The QCM must review, approve, and forward each Production Test Report to the Engineer for review before the splices represented by the report are encased in concrete. The Engineer will have 3 working days to review each Production Test Report and respond in writing after a complete report has been received. Should the Contractor elect to encase any splices before receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase splices pending notification by the Engineer, and in the event the Engineer fails to complete the review and provide notification within the time allowed, and if, in the opinion of the Engineer, the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays."
- Quality assurance test results for each bundle of 4 sets or 4 samples of splices will be reported in writing to the Contractor within 3 working days after receipt of the bundle by the Transportation Laboratory. In the event that more than one bundle is received on the same day, 2 additional working days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received. Should the Contractor elect to encase splices before receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase splices pending notification by the Engineer, and in the event the Engineer fails to complete the review within the time allowed, and in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays."

Section 52-1.11, "Payment," of the Standard Specifications is amended by adding the following paragraph after the seventh paragraph:

- If a portion or all of the reinforcing steel is epoxy-coated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing the epoxy-coated reinforcement will be reduced $5000 for each epoxy-coating facility located more than 480 air line kilometers from both Sacramento and Los Angeles and an additional $3000 ($8000 total) for each epoxy-coating facility located more than 4800 air line kilometers from both Sacramento and Los Angeles.

## SECTION 55: STEEL STRUCTURES

Issue Date: December 31, 2001

Section 55-3.14, "Bolted Connections," of the Standard Specifications is amended by adding the following after the ninth paragraph:

- If a torque multiplier is used in conjunction with a calibrated wrench as a method for tightening fastener assemblies to the required tension, both the multiplier and the wrench shall be calibrated together as a system. The same length input and output sockets and extensions that will be used in the work shall also be included in the calibration of the system. The manufacturer's torque multiplication ratio shall be adjusted during calibration of the system, such that when this adjusted ratio is multiplied by the actual input calibrated wrench reading, the product is a calculated output torque that is within 2 percent of the true output torque. When this system is used in the work to perform any installation tension testing, rotational capacity testing, fastener tightening, or tension verification, it shall be used, intact as calibrated.

The sixth paragraph of Section 55-4.02, "Payment," of the Standard Specifications is amended to read:

- If a portion or all of the structural steel is fabricated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and

extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing the structural steel from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced $5000 or by an amount computed at $0.044 per kilogram of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 4800 air line kilometers from both Sacramento and Los Angeles, payment will be reduced $8000 or by $0.079 per kilogram of structural steel fabricated, whichever is greater.

## SECTION 56: SIGNS

Issue Date: November 2, 2004

Section 56-1.01, "Description," of the Standard Specifications is amended by deleting the third paragraph.

Section 56-1.02A, "Bars, Plates and Shapes," of the Standard Specifications is amended to read:

### 56-1.02A Bars, Plates, Shapes, and Structural Tubing

• Bars, plates, and shapes shall be structural steel conforming to the requirements in ASTM Designation: A 36/A 36M, except, at the option of the Contractor, the light fixture mounting channel shall be continuous-slot steel channel conforming to the requirements in ASTM Designation: A 1011/A 1011M, Designation SS, Grade 33[230], or aluminum Alloy 6063-T6 extruded aluminum conforming to the requirements in ASTM Designation: B 221 or B 221M.

• Structural tubing shall be structural steel conforming to the requirements in ASTM Designation: A 500, Grade B.

• Removable sign panel frames shall be constructed of structural steel conforming to the requirements in ASTM Designation: A 36/A 36M.

Section 56-1.02B, "Sheets," of the Standard Specifications is amended to read:

### 56-1.02B Sheets

• Sheets shall be carbon-steel sheets conforming to the requirements in ASTM Designation: A 1011/A 1011M, Designation SS, Grade 33[230].

• Ribbed sheet metal for box beam-closed truss sign structures shall be fabricated from galvanized sheet steel conforming to the requirements in ASTM Designation: A 653/A 653M, Designation SS, Grade 33[230]. Sheet metal panels shall be G 165 coating designation in conformance with the requirements in ASTM Designation: A 653/A 653M.

Section 56-1.02F, "Steel Walkway Gratings," of the Standard Specifications is amended to read:

### 56-1.02F Steel Walkway Gratings

• Steel walkway gratings shall be furnished and installed in conformance with the details shown on the plans and the following provisions:

A. Gratings shall be the standard product of an established grating manufacturer.
B. Material for gratings shall be structural steel conforming to the requirements in ASTM Designation: A 1011/A 1011M, Designation CS, Type B.
C. For welded type gratings, each joint shall be full resistance welded under pressure, to provide a sound, completely beaded joint.
D. For mechanically locked gratings, the method of fabrication and interlocking of the members shall be approved by the Engineer, and the fabricated grating shall be equal in strength to the welded type.
E. Gratings shall be accurately fabricated and free from warps, twists, or other defects affecting their appearance or serviceability. Ends of all rectangular panels shall be square. The tops of the bearing bars and cross members shall be in the same plane. Gratings distorted by the galvanizing process shall be straightened.

The sixth through the thirteenth paragraphs in Section 56-1.03, "Fabrication," of the Standard Specifications are amended to read:

• High-strength bolted connections, where shown on the plans, shall conform to the provisions in Section 55-3.14, "Bolted Connections," except that only fastener assemblies consisting of a high-strength bolt, nut, hardened washer, and direct tension indicator shall be used.

• High-strength fastener assemblies, and any other bolts, nuts, and washers attached to sign structures shall be zinc-coated by the mechanical deposition process.

- Nuts for high-strength bolts designated as snug-tight shall not be lubricated.
- An alternating snugging and tensioning pattern for anchor bolts and high-strength bolted splices shall be used. Once tensioned, high-strength fastener components and direct tension indicators shall not be reused.
- For bolt diameters less than 10 mm, the diameter of the bolt hole shall be not more than 0.80-mm larger than the nominal bolt diameter. For bolt diameters greater than or equal to 10 mm, the diameter of the bolt hole shall be not more than 1.6 mm larger than the nominal bolt diameter.
- Sign structures shall be fabricated into the largest practical sections prior to galvanizing.
- Ribbed sheet metal panels for box beam closed truss sign structures shall be fastened to the truss members by cap screws or bolts as shown on the plans, or by 4.76 mm stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the large flange rivet head shall be not less than 15.88 mm in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.
- Spalling or chipping of concrete structures shall be repaired by the Contractor at the Contractor's expense.
- Overhead sign supports shall have an aluminum identification plate permanently attached near the base, adjacent to the traffic side on one of the vertical posts, using either stainless steel rivets or stainless steel screws. As a minimum, the information on the plate shall include the name of the manufacturer, the date of manufacture and the contract number.

The fifth paragraph of Section 56-2.02B, "Wood Posts," of the Standard Specifications is amended to read:

- Douglas fir and Hem-Fir posts shall be treated in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," and in conformance with AWPA Use Category System: UC4A, Commodity Specification A. Posts shall be incised and the minimum retention of preservative shall be as specified in AWPA Standards.

## SECTION 57: TIMBER STRUCTURES

Issue Date: October 12, 2004

The second paragraph of Section 57-1.02A, "Structural Timber and Lumber," of the Standard Specifications is amended to read:

- When preservative treatment of timber and lumber is required, the treatment shall conform to the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," and AWPA's Use Category 4B. The type of treatment to be used will be shown on the plans or specified in the special provisions.

## SECTION 58: PRESERVATIVE TREATMENT OF LUMBER, TIMBER AND PILING

Issue Date: November 2, 2004

The first paragraph of Section 58-1.02, "Treatment and Retention," of the Standard Specifications is amended to read:

- Unless otherwise permitted by the Engineer or otherwise specified in the special provisions, the timber, lumber and piling shall be pressure treated after all millwork is completed. The preservatives, treatment and results of treatment shall be in conformance with AWPA Standards U1-03, "User Specification for Treated Wood," and T1-03, "Processing and Treatment." Except as provided below, treatment of lumber and timber shall conform to the specified AWPA Use Category. The type of treatment to be used shall be one of those named in the special provisions, on the plans, or elsewhere in these specifications.

The second paragraph of Section 58-1.02, "Treatment and Retention," of the Standard Specifications is deleted.

## SECTION 59: PAINTING

Issue Date: December 31, 2001

Section 59-2.01, "General," of the Standard Specifications is amended by adding the following paragraphs after the first paragraph:

• Unless otherwise specified, no painting Contractors or subcontractors will be permitted to commence work without having the following current "SSPC: The Society for Protective Coatings" (formerly the Steel Structures Painting Council) certifications in good standing:

A. For cleaning and painting structural steel in the field, certification in conformance with the requirements in Qualification Procedure No. 1, "Standard Procedure For Evaluating Painting Contractors (Field Application to Complex Industrial Structures)" (SSPC-QP 1).
B. For removing paint from structural steel, certification in conformance with the requirements in Qualification Procedure No. 2, "Standard Procedure For Evaluating Painting Contractors (Field Removal of Hazardous Coatings from Complex Structures)" (SSPC-QP 2).
C. For cleaning and painting structural steel in a permanent painting facility, certification in conformance with the requirements in Qualification Procedure No. 3, "Standard Procedure For Evaluating Qualifications of Shop Painting Applicators" (SSPC-QP 3). The AISC's Sophisticated Paint Endorsement (SPE) quality program will be considered equivalent to SSPC-QP 3.

The third paragraph of Section 59-2.03, "Blast Cleaning," of the Standard Specifications is amended to read:

• Exposed steel or other metal surfaces to be blast cleaned shall be cleaned in conformance with the requirements in Surface Preparation Specification No. 6, "Commercial Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave all surfaces with a dense, uniform, angular anchor pattern of not less than 35 µm as measured in conformance with the requirements in ASTM Designation: D 4417.

The first paragraph of Section 59-2.06, "Hand Cleaning," of the Standard Specifications is amended to read:

• Dirt, loose rust and mill scale, or paint which is not firmly bonded to the surfaces shall be removed in conformance with the requirements in Surface Preparation Specification No. 2, "Hand Tool Cleaning," of the "SSPC: The Society for Protective Coatings." Edges of old remaining paint shall be feathered.

The fourth paragraph of Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

• The dry film thickness of the paint will be measured in place with a calibrated Type 2 magnetic film thickness gage in conformance with the requirements of specification SSPC-PA2 of the "SSPC: The Society for Protective Coatings."

## SECTION 75: MISCELLANEOUS METAL

Issue Date: November 2, 2004

The table in the tenth paragraph of Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications is amended to read:

| Material | Specification |
|---|---|
| Steel bars, plates and shapes | ASTM Designation: A 36/A 36M or A 575, A 576 (AISI or M Grades 1016 through 1030) |
| Steel fastener components for general applications: | |
| Bolts and studs | ASTM Designation: A 307 |
| Headed anchor bolts | ASTM Designation: A 307, Grade B, including S1 supplementary requirements |
| Nonheaded anchor bolts | ASTM Designation: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO Designation: M 314 supplementary requirements<br>or AASHTO Designation: M 314, Grade 36 or 55, including S1 supplementary requirements |
| High-strength bolts and studs, threaded rods, and nonheaded anchor bolts | ASTM Designation: A 449, Type 1 |
| Nuts | ASTM Designation: A 563, including Appendix X1* |
| Washers | ASTM Designation: F 844 |
| Components of high-strength steel fastener assemblies for use in structural steel joints: | |
| Bolts | ASTM Designation: A 325, Type 1 |
| Tension control bolts | ASTM Designation: F 1852, Type 1 |
| Nuts | ASTM Designation: A 563, including Appendix X1* |
| Hardened washers | ASTM Designation: F 436, Type 1, Circular, including S1 supplementary requirements |
| Direct tension indicators | ASTM Designation: F 959, Type 325, zinc-coated |
| Stainless steel fasteners (Alloys 304 & 316) for general applications: | |
| Bolts, screws, studs, threaded rods, and nonheaded anchor bolts | ASTM Designation: F 593 or F 738M |
| Nuts | ASTM Designation: F 594 or F 836M |
| Washers | ASTM Designation: A 240/A 240M and ANSI B 18.22M |
| Carbon-steel castings | ASTM Designation: A 27/A 27M, Grade 65-35 [450-240], Class 1 |
| Malleable iron castings | ASTM Designation: A 47, Grade 32510 or A 47M, Grade 22010 |
| Gray iron castings | ASTM Designation: A 48, Class 30B |
| Ductile iron castings | ASTM Designation: A 536, Grade 65-45-12 |
| Cast iron pipe | Commercial quality |
| Steel pipe | Commercial quality, welded or extruded |
| Other parts for general applications | Commercial quality |

* Zinc-coated nuts that will be tightened beyond snug or wrench tight shall be furnished with a dyed dry lubricant conforming to Supplementary Requirement S2 in ASTM Designation: A 563.

The second paragraph in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

• Miscellaneous bridge metal shall consist of the following, except as further provided in Section 51-1.19, "Utility Facilities," and in the special provisions:

A. Bearing assemblies, equalizing bolts and expansion joint armor in concrete structures.
B. Expansion joint armor in steel structures.
C. Manhole frames and covers, frames and grates, ladder rungs, guard posts and access door assemblies.
D. Deck drains, area drains, retaining wall drains, and drainage piping, except drainage items identified as "Bridge Deck Drainage System" in the special provisions.

The table in the eighteenth paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

| Stud Diameter (millimeters) | Sustained Tension Test Load (kilonewtons) |
|---|---|
| 29.01-33.00 | 137.9 |
| 23.01-29.00 | 79.6 |
| 21.01-23.00 | 64.1 |
| * 18.01-21.00 | 22.2 |
| 15.01-18.00 | 18.2 |
| 12.01-15.00 | 14.2 |
| 9.01-12.00 | 9.34 |
| 6.00-9.00 | 4.23 |

* Maximum stud diameter permitted for mechanical expansion anchors.

The table in the nineteenth paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

| Stud Diameter (millimeters) | Ultimate Tensile Load (kilonewtons) |
|---|---|
| 30.01-33.00 | 112.1 |
| 27.01-30.00 | 88.1 |
| 23.01-27.00 | 71.2 |
| 20.01-23.00 | 51.6 |
| 16.01-20.00 | 32.0 |
| 14.01-16.00 | 29.4 |
| 12.00-14.00 | 18.7 |

The table in the twenty-second paragraph of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended to read:

Installation Torque Values, (newton meters)

| Stud Diameter (millimeters) | Shell Type Mechanical Expansion Anchors | Integral Stud Type Mechanical Expansion Anchors | Resin Capsule Anchors and Cast-in-Place Inserts |
|---|---|---|---|
| 29.01-33.00 | — | — | 540 |
| 23.01-29.00 | — | — | 315 |
| 21.01-23.00 | — | — | 235 |
| 18.01-21.00 | 110 | 235 | 200 |
| 15.01-18.00 | 45 | 120 | 100 |
| 12.01-15.00 | 30 | 65 | 40 |
| 9.01-12.00 | 15 | 35 | 24 |
| 6.00-9.00 | 5 | 10 | — |

The third paragraph in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications is amended to read:

- Cables shall be 19 mm preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized, and in conformance with the requirements in Federal Specification RR-W-410D, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 200 kN. Two certified copies of mill test reports of each manufactured length of cable used shall be furnished to the Engineer.

The second paragraph in Section 75-1.05, "Galvanizing," of the Standard Specifications is amended to read:

At the option of the Contractor, material thinner than 3.2 mm shall be galvanized either before fabrication in conformance with the requirements of ASTM Designation: A 653/A 653M, Coating Designation Z600, or after fabrication in conformance with the requirements of ASTM Designation: A 123, except that the weight of zinc coating shall average not less than 365 g per square meter of actual surface area with no individual specimen having a coating weight of less than 305 g per square meter.

## SECTION 80: FENCES

Issue Date: October 12, 2004

The second paragraph of Section 80-3.01B(2), "Treated Wood Posts and Braces," of the Standard Specifications is amended to read:

- Posts and braces to be treated shall be pressure treated in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," and AWPA Use Category System: UC4A, Commodity Specification A or B.

## SECTION 83: RAILINGS AND BARRIERS

Issue Date: January 28, 2005

The first paragraph of Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

- The rail elements, backup plates, terminal sections, end and return caps, bolts, nuts and other fittings shall conform to the requirements in AASHTO Designation: M 180, except as modified in this Section 83-1.02B and as specified in Section 83-1.02. The rail elements, backup plates, terminal sections, end and return caps shall conform to Class A, Type 1 W-Beam guard railing as shown in AASHTO Designation: M 180. The edges and center of the rail element shall contact each post block. Rail element joints shall be lapped not less than 316 mm and bolted. The rail metal, in addition to conforming to the requirements in AASHTO Designation: M 180, shall withstand a cold bend, without cracking, of 180 degrees around a mandrel of a diameter equal to 2.5 times the thickness of the plate.

The ninth paragraph in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

- The grades and species of wood posts and blocks shall be No. 1 timbers (also known as No. 1 structural) Douglas fir or No. 1 timbers Southern yellow pine. Wood posts and blocks shall be graded in conformance with the provisions in Section 57-2, "Structural Timber," of the Standard Specifications, except allowances for shrinkage after mill cutting shall in no case exceed 5 percent of the American Lumber Standards minimum sizes, at the time of installation.

The eleventh paragraph in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

- After fabrication, wood posts and blocks shall be pressure treated in conformance with Section 58, "Preservative Treatment of Lumber, Timber and Piling," and AWPA Use Category System: UC4A, Commodity Specification A.

The twelfth paragraph in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

• If copper naphthenate, ammoniacal copper arsenate, chromated copper arsenate, ammoniacal copper zinc arsenate, ammoniacal copper quat or copper azole is used to treat the wood posts and blocks, the bolt holes shall be treated as follows:

A. Before the bolts are inserted, bolt holes shall be filled with a grease, recommended by the manufacturer for corrosion protection, which will not melt or run at a temperature of 65°C.

The twenty-fourth paragraph of Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended to read:

• End anchor assemblies and rail tensioning assemblies for metal beam guard railing shall be constructed as shown on the plans and shall conform to the following provisions:

An end anchor assembly (Type SFT) for metal beam guard railing shall consist of an anchor cable, an anchor plate, a wood post, a steel foundation tube, a steel soil plate and hardware.

An end anchor assembly (Type CA) for metal beam guard railing shall consist of an anchor cable, an anchor plate, a single anchor rod or double anchor rods, hardware and one concrete anchor.

A rail tensioning assembly for metal beam guard railing shall consist of an anchor cable, an anchor plate, and hardware.

The anchor plate, metal plates, steel foundation tubes and steel soil plate shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36/A 36M.

The anchor rods shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36/A 36M, A 441 or A 572, or ASTM Designation: A 576, Grades 1018, 1019, 1021 or 1026. The eyes shall be hot forged or formed with full penetration welds. After fabrication, anchor rods with eyes that have been formed with any part of the eye below 870°C during the forming operation or with eyes that have been closed by welding shall be thermally stress relieved prior to galvanizing. The completed anchor rod, after galvanizing, shall develop a strength of 220 kN.

In lieu of built-up fabrication of anchor plates as shown on the plans, anchor plates may be press-formed from steel plate, with or without welded seams.

All bolts and nuts shall conform to the requirements in ASTM Designation: A 307, unless otherwise specified in the special provisions or shown on the plans.

Anchor cable shall be 19-mm preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-410D, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 200 kN. Two certified copies of mill test reports of each manufactured length of cable used shall be furnished to the Engineer. The overall length of each cable anchor assembly shall be as shown on the plans, but shall be a minimum of 2 m.

Where shown on the plans, cable clips and a cable thimble shall be used to attach cable to the anchor rod. Thimbles shall be commercial quality, galvanized steel. Cable clips shall be commercial quality drop forged galvanized steel.

The swaged fitting shall be machined from hot-rolled bars of steel conforming to AISI Designation: C 1035, and shall be annealed suitable for cold swaging. The swaged fitting shall be galvanized before swaging. A lock pin hole to accommodate a 6-mm, plated, spring steel pin shall be drilled through the head of the swage fitting to retain the stud in proper position. The manufacturer's identifying mark shall be stamped on the body of the swage fitting.

The 25-mm nominal diameter stud shall conform to the requirements in ASTM Designation: A 449 after galvanizing. Prior to galvanizing, a 10-mm slot for the locking pin shall be milled in the stud end.

The swaged fittings, stud and nut assembly shall develop the specified breaking strength of the cable.

The cable assemblies shall be shipped as a complete unit including stud and nut.

Clevises shall be drop forged galvanized steel and shall develop the specified breaking strength of the cable.

One sample of cable properly fitted with swaged fitting and right hand thread stud at both ends as specified above, including a clevis when shown on the plans, one meter in total length, shall be furnished the Engineer for testing.

The portion of the anchor rod to be buried in earth shall be coated with a minimum 0.5-mm thickness of coal tar enamel conforming to AWWA Standard: C203 or a coal tar epoxy conforming to the requirements in Steel Structures Painting Council Paint Specification No. 16, Coal-Tar Epoxy-Polymide Black Paint or Corps of Engineers Specification, Formula C-200a, Coal-Tar Epoxy Paint.

Metal components of the anchor assembly shall be fabricated in conformance with good shop practice and shall be hot-dip galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing."

Anchor cables shall be tightened after the concrete anchor has cured for at least 5 days.

Concrete used to construct anchors for end anchor assemblies shall be Class 3 or minor concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

Concrete shall be placed against undisturbed material of the excavated holes for end anchors. The top 300 mm of holes shall be formed, if required by the Engineer.

Reinforcing steel in concrete anchors for end anchor assemblies shall conform to the provisions in Section 52, "Reinforcement."

The second paragraph in Section 83-1.02D, "Steel Bridge Railing," of the Standard Specifications is amended to read:

- Structural shapes, tubing, plates, bars, bolts, nuts, and washers shall be structural steel conforming to the provisions in Section 55-2, "Materials." Other fittings shall be commercial quality.

The second and third paragraphs in Section 83-1.02E, "Cable Railing," of the Standard Specifications are replaced with the following paragraph:

- Pipe for posts and braces shall be standard steel pipe or pipe that conforms to the provisions in Section 80-4.01A, "Posts and Braces."

The fourteenth paragraph in Section 83-1.02I, "Chain Link Railing," of the Standard Specifications is amended to read:

- Chain link fabric shall be either 11-gage Type I zinc coated fabric conforming to the requirements in AASHTO Designation: M 181 or 11-gage Type IV polyvinyl chloride (PVC) coated fabric conforming to the requirements in Federal Specification RR-F-191/1D.

The second paragraph of Section 83-1.03, "Measurement," of the Standard Specifications is amended to read:

- Except for metal beam guard railing within the pay limits of a terminal system end treatment or transition railing (Type WB), metal beam guard railing will be measured by the meter along the face of the rail element from end post to end post of the completed railing at each installation. The point of measurement at each end post will be the center of the bolt attaching the rail element to the end post.

The seventh paragraph of Section 83-1.03, "Measurement," of the Standard Specifications is amended to read:

- The quantities of end anchor assemblies (Type SFT or Type CA) and rail tensioning assemblies will be measured as units determined from actual count. An end anchor assembly (Type CA) with 2 cables attached to one concrete anchor will be counted as one terminal anchor assembly (Type CA)for measurement and payment.

The eighth paragraph of Section 83-1.03, "Measurement," of the Standard Specifications is amended to read:

- The quantities of return and end caps and the various types of terminal sections for metal beam guard railing will be determined as units from actual count.

The third paragraph of Section 83-1.04, "Payment," of the Standard Specifications is amended to read:

- The contract unit prices paid for end anchor assembly (Type SFT), end anchor assembly (Type CA), and rail tensioning assembly shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing the end anchor assemblies, complete in place, including drilling anchor plate bolt holes in rail elements, driving steel foundation tubes, excavating for concrete anchor holes and disposing of surplus material, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The fourth paragraph of Section 83-1.04, "Payment," of the Standard Specifications is amended to read:

- The contract unit prices paid for return caps, end caps, and the various types of terminal sections for metal beam guard railing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing terminal sections, return and end caps, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The second paragraph of Section 83-2.02B, "Thrie Beam Barrier," of the Standard Specifications is amended to read:

- Rail elements, backup plates, terminal connectors, terminal sections, and return caps shall conform to Class A, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180.

The fourteenth paragraph of Section 83-2.02B, "Thrie Beam Barrier," of the Standard Specifications is amended to read:

• All metal work shall be fabricated in the shop, and no punching, cutting or welding will be permitted in the field. Rail elements shall be lapped so that the exposed ends will not face approaching traffic. Terminal sections and return caps shall be installed in conformance with the manufacturer's recommendation.

The first paragraph in Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

• Type 50 and 60 series concrete barriers shall be constructed of minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," except as follows:

a. The maximum size of aggregate used for extruded or slip-formed concrete barriers shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5-mm or smaller than 9.5-mm.
b. If the 9.5-mm maximum size aggregate grading is used to construct extruded or slip-formed concrete barriers, the cementitious material content of the minor concrete shall be not less than 400 kg/m$^3$.

The third paragraph in Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

• The concrete paving between the tops of the 2 walls of concrete barrier (Types 50E, 60E, 60GE, and 60SE) and the optional concrete slab at the base between the 2 walls of concrete barrier (Types 50E, 60E, 60GE, and 60SE) shall be constructed of minor concrete conforming to the provisions of Section 90-10, except that the minor concrete shall contain not less than 300 kg of cementitious material per cubic meter.

The first paragraph of Section 83-2.03, "Measurement," of the Standard Specifications is amended to read:

• Except for single thrie beam barrier within the pay limits of transition railing (Type STB), single thrie beam barrier will be measured by the meter from end post to end post along the face of the rail element of the installed barrier. Single thrie beam barriers constructed on each side of piers under structures or other obstructions will be measured for payment along each line of the installed barrier.

The second paragraph of Section 83-2.03, "Measurement," of the Standard Specifications is amended to read:

• Except for double thrie beam barrier within the pay limits of transition railing (Type DTB), double thrie beam barrier will be measured by the meter from end post to end post along the center line of the installed barrier.

The fifth paragraph of Section 83-2.03, "Measurement," of the Standard Specifications is amended to read:

• The quantity of return caps, terminal connectors and the various types of terminal sections for single and double thrie beam barriers will be determined as units from actual count.

The sixth paragraph of Section 83-2.03, "Measurement," of the Standard Specifications is amended to read:

• The quantity of end anchor assemblies will be paid for as units determined from actual count.

The first paragraph of Section 83-2.04, "Payment," of the Standard Specifications is amended to read:

• The various types of thrie beam barrier, measured as specified in Section 83-2.03, "Measurement," will be paid for at the contract price per meter for single or double thrie beam barrier, whichever applies, and the contract unit price or prices for end anchor assemblies, return caps, terminal connectors and the various types of terminal sections.

The second paragraph of Section 83-2.04, "Payment," of the Standard Specifications is amended to read:

• The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the barrier, complete in place, including drilling holes for wood posts, driving posts, backfilling the space around posts, excavating and backfilling end anchor assembly holes, connecting thrie beam barrier to concrete surfaces and disposing of surplus excavated material, and for furnishing, placing, removing and disposing of the temporary railing for closing the gap between existing barrier and the barrier being

constructed as shown on the plans, and as specified in these specifications and the special provisions, and as directed by the Engineer.

The fourth paragraph in Section 83-2.04, "Payments," of the Standard Specifications is amended to read:

- Steel plate barrier attached to concrete barrier at overhead sign foundations, electroliers, drainage structures, and other locations shown on the plans will be measured and paid for as the type of concrete barrier attached thereto.

## SECTION 85: PAVEMENT MARKERS

Issue Date: May 16, 2003

The second through fifth paragraphs in Section 85-1.03, "Sampling, Tolerances and Packaging," of the Standard Specifications are amended to read:

**Sampling**

- Twenty markers selected at random will constitute a representative sample for each lot of markers.
- The lot size shall not exceed 25000 markers.

**Tolerances**

- Three test specimens will be randomly selected from the sample for each test and tested in conformance with these specifications. Should any one of the 3 specimens fail to conform with the requirements in these specifications, 6 additional specimens will be tested. The failure of any one of these 6 specimens shall be cause for rejection of the entire lot or shipment represented by the sample.
- The entire sample of retroreflective pavement markers will be tested for reflectance. The failure of 10 percent or more of the original sampling shall be cause for rejection.

Section 85-1.04, "Non-Reflective Pavement Markers," of the Standard Specifications is amended to read:

**85-1.04 Non-Reflective Pavement Markers**

- Non-reflective pavement markers (Types A and AY) shall be, at the option of the Contractor, either ceramic or plastic conforming to these specifications.
- The top surface of the marker shall be convex with a gradual change in curvature. The top, bottom and sides shall be free of objectionable marks or discoloration that will affect adhesion or appearance.
- The bottom of markers shall have areas of integrally formed protrusions or indentations, which will increase the effective bonding surface area of adhesive. The bottom surface of the marker shall not deviate more than 1.5 mm from a flat surface. The areas of protrusion shall have faces parallel to the bottom of the marker and shall project approximately one mm from the bottom.

The second through fourth paragraphs of Section 85-1.04A, "Non-Reflective Pavement Markers (Ceramic)," of the Standard Specifications are deleted.

The table in the fifth paragraph in Section 85-1.04A, "Non-Reflective Pavement Markers (Ceramic)," of the Standard Specifications is amended to read:

**Testing**

- Tests shall be performed in conformance with the requirements in California Test 669.

| Test | Test Description | Requirement |
|---|---|---|
| a | Bond strength | 4.8 MPa, min. |
| b | Glaze thickness | 180 µm, min. |
| c | Hardness | 6 Moh, min. |
| d | Luminance factor, Type A, white markers only, glazed surface | 75, min. |
| e | Yellowness index, Type A, white markers only, glazed surface | 7, max. |
| f | Color-yellow, Type AY, yellow markers only. The chromaticity coordinates shall be within a color box defined in CTM 669 | Pass |
| g | Compressive strength | 6700 N, min. |
| h | Water absorption | 2.0 %, max. |
| i | Artificial weathering, 500 hours exposure, yellowness index | 20, max. |

Section 85-1.04B, "Non-Reflective Pavement Markers (Plastic)," of the Standard Specifications is amended to read:

**85-1.04B Non-Reflective Pavement Markers (Plastic)**

- Plastic non-reflective pavement markers Types A and AY shall be, at the option of the Contractor, either polypropylene or acrylonitrile-butadiene-styrene (ABS) plastic type.
- Plastic markers shall conform to the testing requirements specified in Section 85-1.04A, "Non-Reflective Pavement Markers (Ceramic)," except that Tests a, b, c, and h shall not apply. The plastic markers shall not be coated with substances that interfere with the ability of the adhesive bonding to the marker.

The sixth and seventh paragraphs in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications are amended to read:

**Testing**

- Tests shall be performed in conformance with the requirements in California Test 669.

| Test Description | Requirement | | |
|---|---|---|---|
| Bond strength[a] | 3.4 MPa, min. | | |
| Compressive strength[b] | 8900 N, min. | | |
| Abrasion resistance, marker must meet the respective specific intensity minimum requirements after abrasion. | Pass | | |
| Water Soak Resistance | No delamination of the body or lens system of the marker nor loss of reflectance | | |
| | Specific Intensity | | |
| Reflectance | Clear | Yellow | Red |
| 0° Incidence Angle, min. | 3.0 | 1.5 | 0.75 |
| 20° Incidence Angle, min. | 1.2 | 0.60 | 0.30 |
| After one year field evaluation | 0.30 | 0.15 | 0.08 |

a Failure of the marker body or filler material prior to reaching 3.4 MPa shall constitute a failing bond strength test.
b Deformation of the marker of more than 3 mm at a load of less than 8900 N or delamination of the shell and the filler material of more than 3 mm regardless of the load required to break the marker shall be cause for rejection of the markers as specified in Section 85-1.03, "Sampling, Tolerances and Packaging."

- Pavement markers to be placed in pavement recesses shall conform to the above requirements for retroreflective pavement markers except that the minimum compressive strength requirement shall be 5338 N.

The eighth paragraph of Section 85-1.05, "Retroreflective Pavement Markers" of the Standard Specifications is deleted.

The eighth paragraph in Section 85-1.06, "Replacement," of the Standard Specifications is amended to read:

- Epoxy adhesive shall not be used to apply non-reflective plastic pavement markers.

## SECTION 86: SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

Issue Date: January 28, 2005

The first paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Except for concrete for cast-in-drilled-hole concrete pile foundations, portland cement concrete shall conform to Section 90-10, "Minor Concrete."

The fifth paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Reinforced cast-in-drilled-hole concrete pile foundations for traffic signal and lighting standards shall conform to the provisions in Section 49, "Piling," with the following exceptions: 1) Material resulting from drilling holes shall be disposed of in conformance with the provisions in Section 86-2.01, "Excavating and Backfilling," and 2) Concrete filling for cast-in-drilled-hole concrete piles will not be considered as designated by compressive strength.

The seventh paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Forms shall be true to line and grade. Tops of foundations for posts and standards, except special foundations, shall be finished to curb or sidewalk grade or as directed by the Engineer. Forms shall be rigid and securely braced in place. Conduit ends and anchor bolts shall be placed in proper position and to proper height, and anchor bolts shall be held in place by means of rigid top and bottom templates. The bottom template shall be made of steel. The bottom template shall provide proper spacing and alignment of the anchor bolts near their bottom embedded end. The bottom template shall be installed before placing footing concrete. Anchor bolts shall not be installed more than 1:40 from vertical.

Section 86-2.03, "Foundations," of the Standard Specifications is amended by deleting the eighth paragraph.

The twelfth paragraph of Section 86-2.03, "Foundations," of the Standard Specifications is amended to read:

- Plumbing of the standards shall be accomplished by adjusting the leveling nuts before placing the mortar or before the foundation is finished to final grade. Shims or other similar devices shall not be used for plumbing or raking of posts, standards, or pedestals. After final adjustments of both top nuts and leveling nuts on anchorage assemblies have been made, firm contact shall exist between all bearing surfaces of the anchor bolt nuts, washers, and the base plates.

The first paragraph of Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications is amended to read:

### 86-2.04 STANDARDS, STEEL PEDESTALS, AND POSTS

- Standards for traffic signals and lighting, and steel pedestals for cabinets and other similar equipment, shall be located as shown on the plans. Bolts, nuts and washers, and anchor bolts for use in signal and lighting support structures shall conform to the provisions in Section 55-2, "Materials." Except when bearing-type connections or slipbases are specified, high-strength bolted connections shall conform to the provisions in Section 55-3.14, "Bolted Connections." Welding, nondestructive testing (NDT) of welds, and acceptance and repair criteria for NDT of steel members shall conform to the requirements of AWS D1.1 and the contract special provisions.

The second paragraph of Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications is amended to read:

- On each lighting standard except Type 1, one rectangular corrosion resistant metal identification tag shall be permanently attached above the hand hole, near the base of the standard, using stainless steel rivets. On each signal pole support, two corrosion resistant metal identification tags shall be attached, one above the hand hole near the base of the vertical standard and one on the underside of the signal mast arm near the arm plate. As a minimum, the information on each identification tag shall include the name of the manufacturer, the date of manufacture, the identification number as shown on the plans, the contract number, and a unique identification code assigned by the fabricator. This number shall be traceable to

a particular contract and the welds on that component, and shall be readable after the support structure is coated and installed. The lettering shall be a minimum of 7 mm high. The information may be either depressed or raised, and shall be legible.

The fourth paragraph of Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications is amended to read:

- Ferrous metal parts of standards, with shaft length of 4.6 m and longer, shall conform to the details shown on the plans, the provisions in Section 55-2, "Materials," except as otherwise noted, and the following requirements:

Except as otherwise specified, standards shall be fabricated from sheet steel of weldable grade having a minimum yield strength, after fabrication, of 276 MPa.

Certified test reports which verify conformance to the minimum yield strength requirements shall be submitted to the Engineer. The test reports may be the mill test reports for the as-received steel or, when the as-received steel has a lower yield strength than required, the Contractor shall provide supportive test data which provides assurance that the Contractor's method of cold forming will consistently increase the tensile properties of the steel to meet the specified minimum yield strength. The supportive test data shall include tensile properties of the steel after cold forming for specific heats and thicknesses.

When a single-ply 8-mm thick pole is specified, a 2-ply pole with equivalent section modulus may be substituted.

Standards may be fabricated of full-length sheets or shorter sections. Each section shall be fabricated from not more than 2 pieces of sheet steel. Where 2 pieces are used, the longitudinal welded seams shall be directly opposite one another. When the sections are butt-welded together, the longitudinal welded seams on adjacent sections shall be placed to form continuous straight seams from base to top of standard.

Butt-welded circumferential joints of tubular sections requiring CJP groove welds shall be made using a metal sleeve backing ring inside each joint. The sleeve shall be 3-mm nominal thickness, or thicker, and manufactured from steel having the same chemical composition as the steel in the tubular sections to be joined. When the sections to be joined have different specified minimum yield strengths, the steel in the sleeve shall have the same chemical composition as the tubular section having the higher minimum yield strength. The width of the metal sleeve shall be consistent with the type of NDT chosen and shall be a minimum width of 25 mm. The sleeve shall be centered at the joint and be in contact with the tubular section at the point of the weld at time of fit-up.

Welds shall be continuous.

The weld metal at the transverse joint shall extend to the sleeve, making the sleeve an integral part of the joint.

During fabrication, longitudinal seams on vertical tubular members of cantilevered support structures shall be centered on and along the side of the pole that the pole plate is located. Longitudinal seams on horizontal tubular members, including signal and luminaire arms, shall be within +/-45 degrees of the bottom of the arm.

The longitudinal seam welds in steel tubular sections may be made by the electric resistance welding process.

Longitudinal seam welds shall have 60 percent minimum penetration, except that within 150 mm of circumferential welds, longitudinal seam welds shall be CJP groove welds. In addition, longitudinal seam welds on lighting support structures having telescopic pole segment splices shall be CJP groove welds on the female end for a length on each end equal to the designated slip fit splice length plus 150 mm.

Exposed circumferential welds, except fillet and fatigue-resistant welds, shall be ground flush (-0, +2mm) with the base metal prior to galvanizing or painting.

Circumferential welds and base plate-to-pole welds may be repaired only one time without written permission from the Engineer.

Exposed edges of the plates that make up the base assembly shall be finished smooth and exposed corners of the plates shall be broken unless otherwise shown on the plans. Shafts shall be provided with slip-fitter shaft caps.

Flatness of surfaces of 1) base plates that are to come in contact with concrete, grout, or washers and leveling nuts; 2) plates in high-strength bolted connections; 3) plates in joints where cap screws are used to secure luminaire and signal arms; and 4) plates used for breakaway slip base assemblies shall conform to the requirements in ASTM A6.

Standards shall be straight, with a permissive variation not to exceed 25 mm measured at the midpoint of a 9-m or 11-m standard and not to exceed 20 mm measured at the midpoint of a 5-m through 6-m standard. Variation shall not exceed 25 mm at a point 4.5 m above the base plate for Type 35 and Type 36 standards.

Zinc-coated nuts used on fastener assemblies having a specified preload (obtained by specifying a prescribed tension, torque value, or degree of turn) shall be provided with a colored lubricant that is clean and dry to the touch. The color of the lubricant shall be in contrast to the zinc coating on the nut so that the presence of the lubricant is visually obvious. In addition, either the lubricant shall be insoluble in water, or fastener components shall be shipped to the job site in a sealed container.

No holes shall be made in structural members unless the holes are shown on the plans or are approved in writing by the Engineer.

Standards with an outside diameter of 300 mm or less shall be round. Standards with an outside diameter greater than 300 mm shall be round or multisided. Multisided standards shall have a minimum of 12 sides which shall be convex and shall have a minimum bend radius of 100 mm.

Mast arms for standards shall be fabricated from material as specified for standards, and shall conform to the dimensions shown on the plans.

The cast steel option for slip bases shall be fabricated from material conforming to the requirements in ASTM Designation: A 27/A 27M, Grade 70-40. Other comparable material may be used if written permission is given by the Engineer. The casting tolerances shall be in conformance with the Steel Founder's Society of America recommendations (green sand molding).

One casting from each lot of 50 castings or less shall be subject to radiographic inspection, in conformance with the requirements in ASTM Designation: E 94. The castings shall comply with the acceptance criteria severity level 3 or better for the types and categories of discontinuities in conformance with the requirements in ASTM Designations: E 186 and E 446. If the one casting fails to pass the inspection, 2 additional castings shall be radiographed. Both of these castings shall pass the inspection, or the entire lot of 50 will be rejected.

Material certifications, consisting of physical and chemical properties, and radiographic films of the castings shall be filed at the manufacturer's office. These certifications and films shall be available for inspection upon request.

High-strength bolts, nuts, and flat washers used to connect slip base plates shall conform to the requirements in ASTM Designation: A 325 or A 325M and shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing."

Plate washers shall be fabricated by saw cutting and drilling steel plate conforming to the requirements in AISI Designation: 1018, and be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing." Prior to galvanizing, burrs and sharp edges shall be removed and holes shall be chamfered sufficiently on each side to allow the bolt head to make full contact with the washer without tension on the bolt.

High-strength cap screws shown on the plans for attaching arms to standards shall conform to the requirements in ASTM Designation: A 325, A 325M, or A 449, and shall comply with the mechanical requirements in ASTM Designation: A 325 or A 325M after galvanizing. The cap screws shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing." The threads of the cap screws shall be coated with a colored lubricant that is clean and dry to the touch. The color of the lubricant shall be in contrast to the color of the zinc coating on the cap screw so that presence of the lubricant is visually obvious. In addition, either the lubricant shall be insoluble in water, or fastener components shall be shipped to the job site in a sealed container.

Unless otherwise specified, bolted connections attaching signal or luminaire arms to poles shall be considered slip critical. Galvanized faying surfaces on plates on luminaire and signal arms and matching plate surfaces on poles shall be roughened by hand using a wire brush prior to assembly and shall conform to the requirements for Class C surface conditions for slip-critical connections in "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," a specification approved by the Research Council on Structural Connections (RCSC) of the Engineering Foundation. For faying surfaces required to be painted, the paint shall be an approved type, brand, and thickness that has been tested and approved according to the RCSC Specification as a Class B coating.

Samples of fastener components will be randomly taken from each production lot by the Engineer and submitted, along with test reports required by appropriate ASTM fastener specifications, for QA testing and evaluation. Sample sizes for each fastener component shall be as determined by the Engineer.

The seventh paragraph of Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications is amended to read:

- To avoid interference of arm plate-to-tube welds with cap screw heads, and to ensure cap screw heads can be turned using conventional installation tools, fabricators shall make necessary adjustments to details prior to fabrication and properly locate the position of arm tubes on arm plates during fabrication.

The sixth and seventh paragraphs of 86-2.12, "Wood Poles," of the Standard Specifications are amended to read:

- After fabrication, wood poles shall be pressure treated in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," and AWPA Use Category System: UC4B, Commodity Specification D.
- Wood poles, when specified in the special provisions to be painted, shall be treated with waterborne wood preservatives.

The first paragraph of Section 86-2.15, "Galvanizing," of the Standard Specifications is amended to read:

• Galvanizing shall be in conformance with the provisions in Section 75-1.05, "Galvanizing," except that cabinets may be constructed of material galvanized prior to fabrication in conformance with the requirements in ASTM Designation: A 653/653M, Coating Designation G 90, in which case all cut or damaged edges shall be painted with at least 2 applications of approved unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint." Aerosol cans shall not be used. Other types of protective coating must be approved by the Engineer prior to installation.

The first paragraph of Section 86-4.06, "Pedestrian Signal Faces" of the Standard Specifications is amended to read:

• Message symbols for pedestrian signal faces shall be white WALKING PERSON and Portland orange UPRAISED HAND conforming to the requirements in the Institute of Transportation Engineers Standards: "Pedestrian Traffic Control Signal Indications," "Manual on Uniform Traffic Control Devices," and "MUTCD California Supplement." The height of each symbol shall be not less than 250 mm and the width of each symbol shall be not less than 165 mm.

The tenth paragraph of Section 86-4.07, "Light Emitting Diode Pedestrian Signal Face 'Upraised Hand' Module" of the Standard Specifications is amended to read:

• The luminance of the "UPRAISED HAND" symbol shall be 3750 cd/m$^2$ minimum. The color of "UPRAISED HAND" shall be Portland orange conforming to the requirements of the Institute of Transportation Engineers Standards: "Pedestrian Traffic Control Signal Indications," "Manual on Uniform Traffic Control Devices," and "MUTCD California Supplement." The height of each symbol shall be not less than 250 mm and the width of each symbol shall be not less than 165 mm.

Section 86-8.01, "Payment," of the Standard Specifications is amended by adding the following paragraph after the first paragraph:

• If a portion or all of the poles for signal, lighting and electrical systems pursuant to Standard Specification Section 86, "Signals, Lighting and Electrical Systems," is fabricated more than 480 air line kilometers from both-Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing such items from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced $5000; in addition, in the case where a fabrication site is located more than 4800 air line kilometers from both Sacramento and Los Angeles, payment will be reduced an additional $3000 per each fabrication site ($8000 total per site).

## SECTION 88: ENGINEERING FABRIC

Issue Date: January 15, 2002

Section 88-1.02, "Pavement Reinforcing Fabric," of the Standard Specifications is amended to read:

• Pavement reinforcing fabric shall be 100 percent polypropylene staple fiber fabric material, needle-punched, thermally bonded on one side, and conform to the following:

| Specification | Requirement |
|---|---|
| Weight, grams per square meter<br>ASTM Designation: D 5261 | 140 |
| Grab tensile strength<br>(25-mm grip), kilonewtons, min. in each direction<br>ASTM Designation: D 4632 | 0.45 |
| Elongation at break, percent min.<br>ASTM Designation: D 4632 | 50 |
| Asphalt retention by fabric, grams per square meter. (Residual Minimum)<br>ASTM Designation: D 6140 | 900 |

Note: Weight, grab, elongation and asphalt retention are based on Minimum Average Roll Value (MARV)

## SECTION 90: PORTLAND CEMENT CONCRETE

Issue Date: November 2, 2004

Section 90, "Portland Cement Concrete," of the Standard Specifications is amended to read:

## SECTION 90: PORTLAND CEMENT CONCRETE
## 90-1 GENERAL

### 90-1.01 DESCRIPTION

- Portland cement concrete shall be composed of cementitious material, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified in these specifications.
- The Contractor shall determine the mix proportions for concrete in conformance with these specifications. Unless otherwise specified, cementitious material shall be a combination of cement and mineral admixture. Cementitious material shall be either:

1. "Type IP (MS) Modified" cement; or
2. A combination of "Type II Modified" portland cement and mineral admixture; or
3. A combination of Type V portland cement and mineral admixture.

- Type III portland cement shall be used only as allowed in the special provisions or with the approval of the Engineer.
- Class 1 concrete shall contain not less than 400 kg of cementitious material per cubic meter.
- Class 2 concrete shall contain not less than 350 kg of cementitious material per cubic meter.
- Class 3 concrete shall contain not less than 300 kg of cementitious material per cubic meter.
- Class 4 concrete shall contain not less than 250 kg of cementitious material per cubic meter.
- Minor concrete shall contain not less than 325 kg of cementitious material per cubic meter unless otherwise specified in these specifications or the special provisions.
- Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic meter of concrete in structures or portions of structures shall conform to the following:

| Use | Cementitious Material Content (kg/m3) |
|---|---|
| Concrete designated by compressive strength: | |
| Deck slabs and slab spans of bridges | 400 min., 475 max. |
| Roof sections of exposed top box culverts | 400 min., 475 max. |
| Other portions of structures | 350 min., 475 max. |
| Concrete not designated by compressive strength: | |
| Deck slabs and slab spans of bridges | 400 min. |
| Roof sections of exposed top box culverts | 400 min. |
| Prestressed members | 400 min. |
| Seal courses | 400 min. |
| Other portions of structures | 350 min. |
| Concrete for precast members | 350 min., 550 max. |

- Whenever the 28-day compressive strength shown on the plans is greater than 25 MPa, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 28 MPa or greater, an additional 14 days will be allowed to obtain the specified strength. The 28-day compressive strengths shown on the plans that are 25 MPa or less are shown for design information only and are not a requirement for acceptance of the concrete.
- Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.
- Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.
- Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be

cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

- If any concrete has a cementitious material, portland cement, or mineral admixture content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.55 for each kilogram of cementitious material, portland cement, or mineral admixture that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions will be made based on the results of California Test 518.
- The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

## 90-2 MATERIALS

### 90-2.01 CEMENT

- Unless otherwise specified, cement shall be either "Type IP (MS) Modified" cement, "Type II Modified" portland cement or Type V portland cement.
- "Type IP (MS) Modified" cement shall conform to the requirements for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate and uniform blend of Type II cement and not more than 35 percent by mass of mineral admixture. The type and minimum amount of mineral admixture used in the manufacture of "Type IP (MS) Modified" cement shall be in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."
- "Type II Modified" portland cement shall conform to the requirements for Type II portland cement in ASTM Designation: C 150-02a.
- In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

A. The cement shall not contain more than 0.60-percent by mass of alkalies, calculated as the percentage of $Na_2O$ plus 0.658 times the percentage of $K_2O$, when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in conformance with the requirements in ASTM Designation: C 114;
B. The autoclave expansion shall not exceed 0.50-percent; and
C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent, except that when cement is to be used for precast prestressed concrete piling, precast prestressed concrete members, or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

- Type III and Type V portland cements shall conform to the requirements in ASTM Designation: C 150-02a and the additional requirements listed above for "Type II Modified" portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.
- Cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.
- Cement shall be protected from exposure to moisture until used. Sacked cement shall be piled to permit access for tally, inspection, and identification of each shipment.
- Adequate facilities shall be provided to assure that cement meeting the provisions specified in this Section 90-2.01 shall be kept separate from other cement in order to prevent any but the specified cement from entering the work. Safe and suitable facilities for sampling cement shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper, in conformance with California Test 125.
- If cement is used prior to sampling and testing as provided in Section 6-1.07, "Certificates of Compliance," and the cement is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the cement manufacturer or supplier of the cement. If the cement is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.
- Cement furnished without a Certificate of Compliance shall not be used in the work until the Engineer has had sufficient time to make appropriate tests and has approved the cement for use.

### 90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.
- Natural aggregates shall be thoroughly and uniformly washed before use.

• The Contractor, at the Contractor's expense, shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.

• Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."

• Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, $D_f$, of the fine aggregate is 60, or greater, when tested for durability in conformance with California Test 229.

• If the results of any one or more of the Cleanness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."

• If the results of either or both the Cleanness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

• If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete which is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $4.60 per cubic meter for paving concrete and $7.20 per cubic meter for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.

• The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs shall be in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."

• No single Cleanness Value, Sand Equivalent or aggregate grading test shall represent more than 250 $m^3$ of concrete or one day's pour, whichever is smaller.

• When the source of an aggregate is changed, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates.

**90-2.02A Coarse Aggregate**

• Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, crushed air-cooled iron blast furnace slag or combinations thereof. Crushed air-cooled blast furnace slag shall not be used in reinforced or prestressed concrete.

• Coarse aggregate shall conform to the following quality requirements:

| Tests | California Test | Requirements |
|---|---|---|
| Loss in Los Angeles Rattler (after 500 revolutions) | 211 | 45% max. |
| Cleanness Value | | |
| Operating Range | 227 | 75 min. |
| Contract Compliance | 227 | 71 min. |

• In lieu of the above Cleanness Value requirements, a Cleanness Value "Operating Range" limit of 71, minimum, and a Cleanness Value "Contract Compliance" limit of 68, minimum, will be used to determine the acceptability of the coarse aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested by California Test 227; and
2. prequalification tests performed in conformance with the requirements in California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

**90-2.02B Fine Aggregate**

• Fine aggregate shall consist of natural sand, manufactured sand produced from larger aggregate or a combination thereof. Manufactured sand shall be well graded.

• Fine aggregate shall conform to the following quality requirements:

| Test | California Test | Requirements |
|---|---|---|
| Organic Impurities | 213 | Satisfactory[a] |
| Mortar Strengths Relative to Ottawa Sand | 515 | 95%, min. |
| Sand Equivalent: | | |
| Operating Range | 217 | 75, min. |
| Contract Compliance | 217 | 71, min. |

a Fine aggregate developing a color darker than the reference standard color solution may be accepted if it is determined by the Engineer, from mortar strength tests, that a darker color is acceptable.

• In lieu of the above Sand Equivalent requirements, a Sand Equivalent "Operating Range" limit of 71 minimum and a Sand Equivalent "Contract Compliance" limit of 68 minimum will be used to determine the acceptability of the fine aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. fine aggregate sampled at the completion of processing at the aggregate production plant had a Sand Equivalent value of not less than 82 when tested by California Test 217; and
2. prequalification tests performed in conformance with California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

**90-2.03 WATER**

• In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as $SO_4$, when tested in conformance with California Test 417. In prestressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as $SO_4$, when tested in conformance with California Test 417. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in conformance with the requirements in ASTM Designation: C 191 or ASTM Designation: C 266 or 2) a reduction in the compressive strength of mortar at 14 days of more than 5 percent, when tested in conformance with the requirements in ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in conformance with the requirements in ASTM Designation: C 109.

• In non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1500 parts per million of sulfates as $SO_4$, when tested in conformance with California Test 417.

• In addition to the above provisions, water for curing concrete shall not contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

• Water reclaimed from mixer wash-out operations may be used in mixing concrete. The water shall not contain coloring agents or more than 300 parts per million of alkalis ($Na_2O + 0.658\ K_2O$) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than ±0.010 during a day's operations.

**90-2.04 ADMIXTURE MATERIALS**

• Admixture materials shall conform to the requirements in the following ASTM Designations:

A. Chemical Admixtures—ASTM Designation: C 494.
B. Air-entraining Admixtures—ASTM Designation: C 260.
C. Calcium Chloride—ASTM Designation: D 98.

D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C 618; silica fume conforming to the requirements in ASTM Designation: C 1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

• Unless otherwise specified in the special provisions, mineral admixtures shall be used in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."

## 90-3 AGGREGATE GRADINGS

### 90-3.01 GENERAL

• Before beginning concrete work, the Contractor shall submit in writing to the Engineer the gradation of the primary aggregate nominal sizes that the Contractor proposes to furnish. If a primary coarse aggregate or the fine aggregate is separated into 2 or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed proportions of each individual size, combined mathematically to indicate one proposed gradation. The proposed gradation shall meet the grading requirements shown in the table in this section, and shall show the percentage passing each of the sieve sizes used in determining the end result.

• The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings," if, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.

• Gradations proposed by the Contractor shall be within the following percentage passing limits:

| Primary Aggregate Nominal Size | Sieve Size | Limits of Proposed Gradation |
|---|---|---|
| 37.5-mm x 19-mm | 25-mm | 19 - 41 |
| 25-mm x 4.75-mm | 19-mm | 52 - 85 |
| 25-mm x 4.75-mm | 9.5-mm | 15 - 38 |
| 12.5-mm x 4.75-mm | 9.5-mm | 40 - 78 |
| 9.5-mm x 2.36-mm | 9.5-mm | 50 - 85 |
| Fine Aggregate | 1.18-mm | 55 - 75 |
| Fine Aggregate | 600-µm | 34 - 46 |
| Fine Aggregate | 300-µm | 16 - 29 |

• Should the Contractor change the source of supply, the Contractor shall submit in writing to the Engineer the new gradations before their intended use.

### 90-3.02 COARSE AGGREGATE GRADING

• The grading requirements for coarse aggregates are shown in the following table for each size of coarse aggregate:

| | Percentage Passing Primary Aggregate Nominal Sizes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 37.5-mm x 19-mm | | 25-mm x 4.75-mm | | 12.5-mm x 4.75-mm | | 9.5-mm x 2.36-mm | |
| Sieve Sizes | Operating Range | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance | Operating Range | Contract Compliance |
| 50-mm | 100 | 100 | — | — | — | — | — | — |
| 37.5-mm | 88-100 | 85-100 | 100 | 100 | — | — | — | — |
| 25-mm | x ± 18 | X ± 25 | 88-100 | 86-100 | — | — | — | — |
| 19-mm | 0-17 | 0-20 | X ± 15 | X ± 22 | 100 | 100 | — | — |
| 12.5-mm | — | — | — | — | 82-100 | 80-100 | 100 | 100 |
| 9.5-mm | 0-7 | 0-9 | X ± 15 | X ± 22 | X ± 15 | X ± 22 | X ± 15 | X ± 20 |
| 4.75-mm | — | — | 0-16 | 0-18 | 0-15 | 0-18 | 0-25 | 0-28 |
| 2.36-mm | — | — | 0-6 | 0-7 | 0-6 | 0-7 | 0-6 | 0-7 |

• In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."

• Coarse aggregate for the 37.5-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," shall be furnished in 2 or more primary aggregate nominal sizes. Each primary aggregate

nominal size may be separated into 2 sizes and stored separately, provided that the combined material conforms to the grading requirements for that particular primary aggregate nominal size.

- When the 25-mm, maximum, combined aggregate grading as provided in Section 90-3.04, "Combined Aggregate Gradings," is to be used, the coarse aggregate may be separated into 2 sizes and stored separately, provided that the combined material shall conform to the grading requirements for the 25-mm x 4.75-mm primary aggregate nominal size.

### 90-3.03 FINE AGGREGATE GRADING

- Fine aggregate shall be graded within the following limits:

| Sieve Sizes | Percentage Passing | |
|---|---|---|
| | Operating Range | Contract Compliance |
| 9.5-mm | 100 | 100 |
| 4.75-mm | 95-100 | 93-100 |
| 2.36-mm | 65-95 | 61-99 |
| 1.18-mm | X ± 10 | X ± 13 |
| 600-µm | X ± 9 | X ± 12 |
| 300-µm | X ± 6 | X ± 9 |
| 150-µm | 2-12 | 1-15 |
| 75-µm | 0-8 | 0-10 |

- In the above table, the symbol X is the gradation that the Contractor proposes to furnish for the specific sieve size as provided in Section 90-3.01, "General."
- In addition to the above required grading analysis, the distribution of the fine aggregate sizes shall be such that the difference between the total percentage passing the 1.18-mm sieve and the total percentage passing the 600-µm sieve shall be between 10 and 40, and the difference between the percentage passing the 600-µm and 300-µm sieves shall be between 10 and 40.
- Fine aggregate may be separated into 2 or more sizes and stored separately, provided that the combined material conforms to the grading requirements specified in this Section 90-3.03.

### 90-3.04 COMBINED AGGREGATE GRADINGS

- Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein.
- The combined aggregate grading, except when otherwise specified in these specifications or the special provisions, shall be either the 37.5-mm, maximum grading, or the 25-mm, maximum grading, at the option of the Contractor.

Grading Limits of Combined Aggregates

| Sieve Sizes | Percentage Passing | | | |
|---|---|---|---|---|
| | 37.5-mm Max. | 25-mm Max. | 12.5-mm Max. | 9.5-mm Max. |
| 50-mm | 100 | — | — | — |
| 37.5-mm | 90-100 | 100 | — | — |
| 25-mm | 50-86 | 90-100 | — | — |
| 19-mm | 45-75 | 55-100 | 100 | — |
| 12.5-mm | — | — | 90-100 | 100 |
| 9.5-mm | 38-55 | 45-75 | 55-86 | 50 - 100 |
| 4.75-mm | 30-45 | 35-60 | 45-63 | 45 - 63 |
| 2.36-mm | 23-38 | 27-45 | 35-49 | 35 - 49 |
| 1.18-mm | 17-33 | 20-35 | 25-37 | 25 - 37 |
| 600-µm | 10-22 | 12-25 | 15-25 | 15 - 25 |
| 300-µm | 4-10 | 5-15 | 5-15 | 5 - 15 |
| 150-µm | 1-6 | 1-8 | 1-8 | 1 - 8 |
| 75-µm | 0-3 | 0-4 | 0-4 | 0 - 4 |

- Changes from one grading to another shall not be made during the progress of the work unless permitted by the Engineer.

## 90-4 ADMIXTURES

### 90-4.01 GENERAL

- Admixtures used in portland cement concrete shall conform to and be used in conformance with the provisions in this Section 90-4 and the special provisions. Admixtures shall be used when specified or ordered by the Engineer and may be used at the Contractor's option as provided herein.
- Chemical admixtures and air-entraining admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.
- Calcium chloride shall not be used in concrete except when otherwise specified.
- Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.
- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

### 90-4.02 MATERIALS

- Admixture materials shall conform to the provisions in Section 90–2.04, "Admixture Materials."

### 90-4.03 ADMIXTURE APPROVAL

- No admixture brand shall be used in the work unless it is on the Department's current list of approved brands for the type of admixture involved.
- Admixture brands will be considered for addition to the approved list if the manufacturer of the admixture submits to the Transportation Laboratory a sample of the admixture accompanied by certified test results demonstrating that the admixture complies with the requirements in the appropriate ASTM Designation and these specifications. The sample shall be sufficient to permit performance of all required tests. Approval of admixture brands will be dependent upon a determination as to compliance with the requirements, based on the certified test results submitted, together with tests the Department may elect to perform.
- When the Contractor proposes to use an admixture of a brand and type on the current list of approved admixture brands, the Contractor shall furnish a Certificate of Compliance from the manufacturer, as provided in Section 6-1.07, "Certificates of Compliance," certifying that the admixture furnished is the same as that previously approved. If a previously approved admixture is not accompanied by a Certificate of Compliance, the admixture shall not be used in the work until the Engineer has had sufficient time to make the appropriate tests and has approved the admixture for use. The Engineer may take samples for testing at any time, whether or not the admixture has been accompanied by a Certificate of Compliance.
- If a mineral admixture is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the manufacturer or supplier of the mineral admixture. If the mineral admixture is used in ready-mix concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

### 90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE

- When the use of a chemical admixture or calcium chloride is specified, the admixture shall be used at the dosage specified, except that if no dosage is specified, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.
- Calcium chloride shall be dispensed in liquid, flake, or pellet form. Calcium chloride dispensed in liquid form shall conform to the provisions for dispensing liquid admixtures in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures."

### 90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

- The Contractor will be permitted to use Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:

A. When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by mass, except that the resultant cementitious material content shall be not less than 300 kilograms per cubic meter; and
B. When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

• Unless otherwise specified, a Type C accelerating chemical admixture conforming to the requirements in ASTM Designation: C 494, may be used in portland cement concrete. Inclusion in the mix design submitted for approval will not be required provided that the admixture is added to counteract changing conditions that contribute to delayed setting of the portland cement concrete, and the use or change in dosage of the admixture is approved in writing by the Engineer.

**90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES**

• When air-entrainment is specified or ordered by the Engineer, the air-entraining admixture shall be used in amounts to produce a concrete having the specified air content as determined by California Test 504.

**90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES**

• When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent, and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

**90-4.08 REQUIRED USE OF MINERAL ADMIXTURES**

• Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material.

• The calcium oxide content shall not exceed 10 percent when determined in conformance with the requirements in ASTM Designation: C 114. The available alkali content (as sodium oxide equivalent) shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 311, or the total alkali content (as sodium oxide equivalent) shall not exceed 5.0 percent when determined in conformance with the requirements in ASTM Designation: D 4326.

• The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content;
B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

    1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix;
    2. When the calcium oxide content of a mineral admixture is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix;
    3. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix

C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

**90-4.09 BLANK**

**90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES**

• Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form. Dispensers for liquid admixtures shall have sufficient capacity to measure at one time the prescribed quantity required for each batch of concrete. Each dispenser shall include a graduated measuring unit into which liquid admixtures are measured to within ±5 percent of the prescribed quantity for each batch. Dispensers shall be located and maintained so that the graduations can be accurately read from the point at which proportioning operations are controlled to permit a visual check of batching accuracy prior to discharge. Each measuring unit shall be clearly marked for the type and quantity of admixture.

- Each liquid admixture dispensing system shall be equipped with a sampling device consisting of a valve located in a safe and readily accessible position such that a sample of the admixture may be withdrawn slowly by the Engineer.
- If more than one liquid admixture is used in the concrete mix, each liquid admixture shall have a separate measuring unit and shall be dispensed by injecting equipment located in such a manner that the admixtures are not mixed at high concentrations and do not interfere with the effectiveness of each other. When air-entraining admixtures are used in conjunction with other liquid admixtures, the air-entraining admixture shall be the first to be incorporated into the mix.
- When automatic proportioning devices are required for concrete pavement, dispensers for liquid admixtures shall operate automatically with the batching control equipment. The dispensers shall be equipped with an automatic warning system in good operating condition that will provide a visible or audible signal at the point at which proportioning operations are controlled when the quantity of admixture measured for each batch of concrete varies from the preselected dosage by more than 5 percent, or when the entire contents of the measuring unit are not emptied from the dispenser into each batch of concrete.
- Unless liquid admixtures are added to premeasured water for the batch, their discharge into the batch shall be arranged to flow into the stream of water so that the admixtures are well dispersed throughout the batch, except that air-entraining admixtures may be dispensed directly into moist sand in the batching bins provided that adequate control of the air content of the concrete can be maintained.
- Liquid admixtures requiring dosages greater than 2.5 $L/m^3$ shall be considered to be water when determining the total amount of free water as specified in Section 90-6.06, "Amount of Water and Penetration."
- Special admixtures, such as "high range" water reducers that may contribute to a high rate of slump loss, shall be measured and dispensed as recommended by the admixture manufacturer and as approved by the Engineer.

### 90-4.11 STORAGE, PROPORTIONING, AND DISPENSING OF MINERAL ADMIXTURES

- Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.
- Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.
- Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.
- When concrete is completely mixed in stationary paving mixers, the mineral admixture shall be weighed in a separate weigh hopper conforming to the provisions for cement weigh hoppers and charging and discharging mechanisms in Section 90-5.03A, "Proportioning for Pavement," and the mineral admixture and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the mineral admixture is not weighed in a separate weigh hopper, the Contractor shall provide certification that the stationary mixer is capable of mixing the cement, admixture, aggregates and water uniformly prior to discharge. Certification shall contain the following:

A. Test results for 2 compressive strength test cylinders of concrete taken within the first one-third and 2 compressive strength test cylinders of concrete taken within the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;"
B. Calculations demonstrating that the difference in the averages of 2 compressive strengths taken in the first one-third is no greater than 7.5 percent different than the averages of 2 compressive strengths taken in the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;" and
C. The mixer rotation speed and time of mixing prior to discharge that are required to produce a mix that meets the requirements above.

## 90-5 PROPORTIONING

### 90-5.01 STORAGE OF AGGREGATES

- Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size shall be avoided and also that the various sizes shall not become intermixed before proportioning.
- Aggregates shall be stored or stockpiled and handled in a manner that shall prevent contamination by foreign materials. In addition, storage of aggregates at batching or mixing facilities that are erected subsequent to the award of the contract and that furnish concrete to the project shall conform to the following:

A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and
B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.

• In placing aggregates in storage or in moving the aggregates from storage to the weigh hopper of the batching plant, any method that may cause segregation, degradation, or the combining of materials of different gradings that will result in any size of aggregate at the weigh hopper failing to meet the grading requirements, shall be discontinued. Any method of handling aggregates that results in excessive breakage of particles shall be discontinued. The use of suitable devices to reduce impact of falling aggregates may be required by the Engineer.

**90-5.02 PROPORTIONING DEVICES**

• Weighing, measuring, or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, automatic weighing systems shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." Automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.

• Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy.

• Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the mass of each batch of material shall not vary from the mass designated by the Engineer by more than the tolerances specified herein.

• Equipment for cumulative weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ±0.5 percent of the individual batch mass designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall have a zero tolerance of ±0.5 percent of their designated individual batch masses. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.

• The mass indicated for any batch of material shall not vary from the preselected scale setting by more than the following:

A. Aggregate weighed cumulatively shall be within 1.0 percent of the designated total batch mass of the aggregate. Aggregates weighed individually shall be within 1.5 percent of their respective designated batch masses; and
B. Cement shall be within 1.0 percent of its designated batch mass. When weighed individually, mineral admixture shall be within 1.0 percent of its designated batch mass. When mineral admixture and cement are permitted to be weighed cumulatively, cement shall be weighed first to within 1.0 percent of its designated batch mass, and the total for cement and mineral admixture shall be within 1.0 percent of the sum of their designated batch masses; and
C. Water shall be within 1.5 percent of its designated mass or volume.

• Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a mass not exceeding the maximum permissible mass variation above, except that no scale shall be required having a capacity of less than 500 kg, with 0.5-kg graduations.

**90-5.03 PROPORTIONING**

• Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture, and water as provided in these specifications. Aggregates shall be proportioned by mass.

• At the time of batching, aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.
- Bulk "Type IP (MS) Modified" cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.
- Bulk cement and mineral admixture may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.
- When cement and mineral admixtures are weighed in separate weigh hoppers**,** the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.
- The scales and weigh hoppers for bulk weighing cement, mineral admixture, or cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.
- For batches with a volume of one cubic meter or more, the batching equipment shall conform to one of the following combinations:

A. Separate boxes and separate scale and indicator for weighing each size of aggregate.
B. Single box and scale indicator for all aggregates.
C. Single box or separate boxes and automatic weighing mechanism for all aggregates.

- In order to check the accuracy of batch masses, the gross mass and tare mass of batch trucks, truck mixers, truck agitators, and non-agitating hauling equipment shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

**90-5.03A Proportioning for Pavement**

- Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by mass by means of automatic proportioning devices of approved type conforming to these specifications.
- The Contractor shall install and maintain in operating condition an electronically actuated moisture meter that will indicate, on a readily visible scale, changes in the moisture content of the fine aggregate as it is batched within a sensitivity of 0.5 percent by mass of the fine aggregate.
- The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with masses that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the mass of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.
- When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.
- Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.
- When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required mass is discharged into the weigh box, after which the gate shall automatically close and lock.
- The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

## 90-6 MIXING AND TRANSPORTING

### 90-6.01 GENERAL

- Concrete shall be mixed in mechanically operated mixers, except that when permitted by the Engineer, batches not exceeding 0.25 $m^3$ may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."
- Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.
- Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.
- Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.
- When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 10 mm. When the mix design specifies a slump value, the difference in slump, determined by comparing slump tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed the values given in the table below. Variation in the proportion of coarse aggregate will be determined by comparing the results of tests of 2 samples of mixed concrete from the same batch or truck mixer load and the difference between the 2 results shall not exceed 100 kg per cubic meter of concrete.

| Average Slump | Maximum Permissible Difference |
|---|---|
| Less than 100-mm | 25-mm |
| 100-mm to 150-mm | 38-mm |
| Greater than 150-mm to 225-mm | 50-mm |

- The Contractor, at the Contractor's expense, shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

### 90-6.02 MACHINE MIXING

- Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.
- The temperature of mixed concrete, immediately before placing, shall be not less than 10°C or more than 32°C. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits. Neither aggregates nor mixing water shall be heated to exceed 65°C. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.
- The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one-fourth of the specified mixing time.
- Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.
- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
- The size of batch shall not exceed the manufacturer's guaranteed capacity.
- When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
- Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:

A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (central-mixed concrete).
B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
C. Mixed completely in a truck mixer (transit-mixed concrete).
D. Mixed completely in a paving mixer.

- Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.
- Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.
- When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

**90-6.03 TRANSPORTING MIXED CONCRETE**

- Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."
- Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.
- Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.
- Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 24°C.
- No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.
- The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.
- When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time allowed may be less than 1.5 hours.
- When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 30°C or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.
- Each load of concrete delivered at the jobsite shall be accompanied by a weighmaster certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale masses (kilograms) for the ingredients batched. Theoretical or target batch masses shall not be used as a substitute for actual scale masses.
- Weighmaster certificates shall be provided in printed form, or if approved by the Engineer, the data may be submitted in electronic media. Electronic media shall be presented in a tab-delimited format on a 90 mm diskette with a capacity of at least 1.4 megabytes. Captured data, for the ingredients represented by each batch shall be "line feed, carriage return" (LFCR) and "one line, separate record" with allowances for sufficient fields to satisfy the amount of data required by these specifications.
- The Contractor may furnish a weighmaster certificate accompanied by a separate certificate that lists the actual batch masses or measurements for a load of concrete provided that both certificates are imprinted with the same non-repeating load number that is unique to the contract and delivered to the jobsite with the load.
- Weighmaster certificates furnished by the Contractor shall conform to the provisions in Section 9-1.01, "Measurement of Quantities."

**90-6.04 TIME OR AMOUNT OF MIXING**

- Mixing of concrete in paving or stationary mixers shall continue for the required mixing time after all ingredients, except water and admixture, if added with the water, are in the mixing compartment of the mixer before any part of the batch is released. Transfer time in multiple drum mixers shall not be counted as part of the required mixing time.

• The required mixing time, in paving or stationary mixers, of concrete used for concrete structures, except minor structures, shall be not less than 90 seconds or more than 5 minutes, except that when directed by the Engineer in writing, the requirements of the following paragraph shall apply.

• The required mixing time, in paving or stationary mixers, except as provided in the preceding paragraph, shall be not less than 50 seconds or more than 5 minutes.

• The minimum required revolutions at the mixing speed for transit-mixed concrete shall not be less than that recommended by the mixer manufacturer, but in no case shall the number of revolutions be less than that required to consistently produce concrete conforming to the provisions for uniformity in Section 90-6.01, "General."

**90-6.05 HAND-MIXING**

• Hand-mixed concrete shall be made in batches of not more than 0.25 $m^3$ and shall be mixed on a watertight, level platform. The proper amount of coarse aggregate shall be measured in measuring boxes and spread on the platform and the fine aggregate shall be spread on this layer, the 2 layers being not more than 0.3 meters in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

**90-6.06 AMOUNT OF WATER AND PENETRATION**

• The amount of water used in concrete mixes shall be regulated so that the penetration of the concrete as determined by California Test 533 or the slump of the concrete as determined by ASTM Designation: C 143 is within the "Nominal" values shown in the following table. When the penetration or slump of the concrete is found to exceed the nominal values listed, the mixture of subsequent batches shall be adjusted to reduce the penetration or slump to a value within the nominal range shown. Batches of concrete with a penetration or slump exceeding the maximum values listed shall not be used in the work. When Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 225 mm after the chemical admixtures are added.

| Type of Work | Nominal | | Maximum | |
|---|---|---|---|---|
| | Penetration (mm) | Slump (mm) | Penetration (mm) | Slump (mm) |
| Concrete Pavement | 0-25 | — | 40 | — |
| Non-reinforced concrete facilities | 0-35 | — | 50 | — |
| Reinforced concrete structures | | | | |
| Sections over 300-mm thick | 0-35 | — | 65 | — |
| Sections 300-mm thick or less | 0-50 | — | 75 | — |
| Concrete placed under water | — | 150-200 | — | 225 |
| Cast-in-place concrete piles | 65-90 | 130-180 | 100 | 200 |

• The amount of free water used in concrete shall not exceed 183 kg/$m^3$, plus 20 kg for each required 100 kg of cementitious material in excess of 325 kg/$m^3$.

• The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.

• Where there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic meter of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 kg of water per added 100 kg of cementitious material per cubic meter. The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.

• The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dribbling. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

## 90-7 CURING CONCRETE

### 90-7.01 METHODS OF CURING

- Newly placed concrete shall be cured by the methods specified in this Section 90-7.01 and the special provisions.

#### 90-7.01A Water Method

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.
- When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.
- At the option of the Contractor, a curing medium consisting of white opaque polyethylene sheeting extruded onto burlap may be used to cure concrete structures. The polyethylene sheeting shall have a minimum thickness of 100 µm, and shall be extruded onto 283.5 gram burlap.
- At the option of the Contractor, a curing medium consisting of polyethylene sheeting may be used to cure concrete columns. The polyethylene sheeting shall have a minimum thickness of 250 µm achieved in a single layer of material.
- If the Contractor chooses to use polyethylene sheeting or polyethylene sheeting on burlap as a curing medium as specified above, these mediums and any joints therein shall be secured as necessary to provide moisture retention and shall be within 75 mm of the concrete at all points along the surface being cured. When these mediums are used, the temperature of the concrete shall be monitored during curing. If the temperature of the concrete cannot be maintained below 60°C, this method of curing shall be discontinued, and one of the other curing methods allowed for the concrete shall be used.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

#### 90-7.01B Curing Compound Method

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:

1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
4. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.
6. Non-pigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.
- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.15-kg/m$^2$ in 24 hours.
- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.
- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.
- Curing compound shall be applied at a nominal rate of 3.7 m$^2$/L, unless otherwise specified.
- At any point, the application rate shall be within ±1.2 m$^2$/L of the nominal rate specified, and the average application rate shall be within ±0.5 m$^2$/L of the nominal rate specified when tested in conformance with the requirements in California Test 535. Runs, sags, thin areas, skips, or holidays in the applied curing compound shall be evidence that the application is not satisfactory.
- Curing compounds shall be applied using power operated spray equipment. The power operated spraying equipment shall be equipped with an operational pressure gage and a means of controlling the pressure. Hand spraying of

small and irregular areas that are not reasonably accessible to mechanical spraying equipment, in the opinion of the Engineer, may be permitted.

- The curing compound shall be applied to the concrete following the surface finishing operation, immediately before the moisture sheen disappears from the surface, but before any drying shrinkage or craze cracks begin to appear. In the event of any drying or cracking of the surface, application of water with an atomizing nozzle as specified in Section 90-7.01A, "Water Method," shall be started immediately and shall be continued until application of the compound is resumed or started; however, the compound shall not be applied over any resulting freestanding water. Should the film of compound be damaged from any cause before the expiration of 7 days after the concrete is placed in the case of structures and 72 hours in the case of pavement, the damaged portion shall be repaired immediately with additional compound.
- At the time of use, compounds containing pigments shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. A paddle shall be used to loosen all settled pigment from the bottom of the container, and a power driven agitator shall be used to disperse the pigment uniformly throughout the vehicle.
- Agitation shall not introduce air or other foreign substance into the curing compound.
- The manufacturer shall include in the curing compound the necessary additives for control of sagging, pigment settling, leveling, de-emulsification, or other requisite qualities of a satisfactory working material. Pigmented curing compounds shall be manufactured so that the pigment does not settle badly, does not cake or thicken in the container, and does not become granular or curdled. Settlement of pigment shall be a thoroughly wetted, soft, mushy mass permitting the complete and easy vertical penetration of a paddle. Settled pigment shall be easily redispersed, with minimum resistance to the sideways manual motion of the paddle across the bottom of the container, to form a smooth uniform product of the proper consistency.
- Curing compounds shall remain sprayable at temperatures above 4°C and shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 1040-L totes, 210-L barrels

or 19-L pails shall be supplied from a suitable storage tank located at the jobsite. The containers shall comply with "Title 49, Code of Federal Regulations, Hazardous Materials Regulations." The 1040-L totes and the 210-L barrels shall have removable lids and airtight fasteners. The 19-L pails shall be round and have standard full open head and bail. Lids with bungholes shall not be permitted. Settling or separation of solids in containers, except tanks, must be completely redispersed with low speed mixing prior to use, in conformance with these specifications and the manufacturer's recommendations. Mixing shall be accomplished either manually by use of a paddle or by use of a mixing blade driven by a drill motor, at low speed. Mixing blades shall be the type used for mixing paint. On site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.

- Steel containers and lids shall be lined with a coating that will prevent destructive action by the compound or chemical agents in the air space above the compound. The coating shall not come off the container or lid as skins. Containers shall be filled in a manner that will prevent skinning. Plastic containers shall not react with the compound.
- Each container shall be labeled with the manufacturer's name, kind of curing compound, batch number, volume, date of manufacture, and volatile organic compound (VOC) content. The label shall also warn that the curing compound containing pigment shall be well stirred before use. Precautions concerning the handling and the application of curing compound shall be shown on the label of the curing compound containers in conformance with the Construction Safety Orders and General Industry Safety Orders of the State of California.
- Containers of curing compound shall be labeled to indicate that the contents fully comply with the rules and regulations concerning air pollution control in the State of California.
- When the curing compound is shipped in tanks or tank trucks, a shipping invoice shall accompany each load. The invoice shall contain the same information as that required herein for container labels.
- Curing compound will be sampled by the Engineer at the source of supply or at the jobsite or at both locations.
- Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.
- Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

**90-7.01C Waterproof Membrane Method**

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.

• The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 100 mm.

• The sheets shall be securely weighted down by placing a bank of earth on the edges of the sheets or by other means satisfactory to the Engineer.

• Should any portion of the sheets be broken or damaged before the expiration of 72 hours after being placed, the broken or damaged portions shall be immediately repaired with new sheets properly cemented into place.

• Sections of membrane that have lost their waterproof qualities or have been damaged to such an extent as to render them unfit for curing the concrete shall not be used.

**90-7.01D Forms-In-Place Method**

• Formed surfaces of concrete may be cured by retaining the forms in place. The forms shall remain in place for a minimum period of 7 days after the concrete has been placed, except that for members over 0.5-m in least dimension the forms shall remain in place for a minimum period of 5 days.

• Joints in the forms and the joints between the end of forms and concrete shall be kept moisture tight during the curing period. Cracks in the forms and cracks between the forms and the concrete shall be resealed by methods subject to the approval of the Engineer.

## 90-7.02 CURING PAVEMENT

• The entire exposed area of the pavement, including edges, shall be cured by the waterproof membrane method, or curing compound method using curing compound (1) or (2) as the Contractor may elect. Should the side forms be removed before the expiration of 72 hours following the start of curing, the exposed pavement edges shall also be cured. If the pavement is cured by means of the curing compound method, the sawcut and all portions of the curing compound that have been disturbed by sawing operations shall be restored by spraying with additional curing compound.

• Curing shall commence as soon as the finishing process provided in Section 40-1.10, "Final Finishing," has been completed. The method selected shall conform to the provisions in Section 90-7.01, "Methods of Curing."

• When the curing compound method is used, the compound shall be applied to the entire pavement surface by mechanical sprayers. Spraying equipment shall be of the fully atomizing type equipped with a tank agitator that provides for continual agitation of the curing compound during the time of application. The spray shall be adequately protected against wind, and the nozzles shall be so oriented or moved mechanically transversely as to result in the minimum specified rate of coverage being applied uniformly on exposed faces. Hand spraying of small and irregular areas, and areas inaccessible to mechanical spraying equipment, in the opinion of the Engineer, will be permitted. When the ambient air temperature is above 15°C, the Contractor shall fog the surface of the concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

## 90-7.03 CURING STRUCTURES

• Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."

• The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).

• The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1).

• Concrete surfaces of minor structures, as defined in Section 51-1.02, "Minor Structures," shall be cured by the water method, the forms-in-place method or the curing compound method.

• When deemed necessary by the Engineer during periods of hot weather, water shall be applied to concrete surfaces being cured by the curing compound method or by the forms-in-place method, until the Engineer determines that a cooling effect is no longer required. Application of water for this purpose will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

## 90-7.04 CURING PRECAST CONCRETE MEMBERS

• Precast concrete members shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing." Curing shall be provided for the minimum time specified for each method or until the concrete reaches

its design strength, whichever is less. Steam curing may also be used for precast members and shall conform to the following provisions:

A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 10°C and 32°C.
B. To prevent moisture loss on exposed surfaces during the presteaming period, members shall be covered as soon as possible after casting or the exposed surfaces shall be kept wet by fog spray or wet blankets.
C. Enclosures for steam curing shall allow free circulation of steam about the member and shall be constructed to contain the live steam with a minimum moisture loss. The use of tarpaulins or similar flexible covers will be permitted, provided they are kept in good repair and secured in such a manner as to prevent the loss of steam and moisture.
D. Steam at the jets shall be at low pressure and in a saturated condition. Steam jets shall not impinge directly on the concrete, test cylinders, or forms. During application of the steam, the temperature rise within the enclosure shall not exceed 22°C per hour. The curing temperature throughout the enclosure shall not exceed 65°C and shall be maintained at a constant level for a sufficient time necessary to develop the required transfer strength. Control cylinders shall be covered to prevent moisture loss and shall be placed in a location where temperature is representative of the average temperature of the enclosure.
E. Temperature recording devices that will provide an accurate, continuous, permanent record of the curing temperature shall be provided. A minimum of one temperature recording device per 60 m of continuous bed length will be required for checking temperature.
F. Members in pretension beds shall be detensioned immediately after the termination of steam curing while the concrete and forms are still warm, or the temperature under the enclosure shall be maintained above 15°C until the stress is transferred to the concrete.
G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

### 90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

• Newly placed concrete for precast prestressed concrete piles shall be cured in conformance with the provisions in Section 90-7.04, "Curing Precast Concrete Members," except that piles in a corrosive environment shall be cured as follows:

A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."
B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

### 90-7.06 CURING SLOPE PROTECTION

• Concrete slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."

• Concreted-rock slope protection shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing," or with a blanket of earth kept wet for 72 hours, or by sprinkling with a fine spray of water every 2 hours during the daytime for a period of 3 days.

### 90-7.07 CURING MISCELLANEOUS CONCRETE WORK

• Exposed surfaces of curbs shall be cured by pigmented curing compounds as specified in Section 90-7.01B, "Curing Compound Method."

• Concrete sidewalks, gutter depressions, island paving, curb ramps, driveways, and other miscellaneous concrete areas shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."

• Shotcrete shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

• Mortar and grout shall be cured by keeping the surface damp for 3 days.

• After placing, the exposed surfaces of sign structure foundations, including pedestal portions, if constructed, shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

## 90-8 PROTECTING CONCRETE

### 90-8.01 GENERAL

• In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8.

• Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.

• Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.

• Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

### 90-8.02 PROTECTING CONCRETE STRUCTURES

• Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 7°C for 72 hours after placing and at not less than 4°C for an additional 4 days. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

### 90-8.03 PROTECTING CONCRETE PAVEMENT

• Pavement concrete shall be maintained at a temperature of not less than 4°C for 72 hours. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

• Except as provided in Section 7-1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Stockpiling, drifting, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.

• When ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work.". Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 3.8 MPa. The modulus of rupture will be determined by California Test 523.

• No traffic or Contractor's equipment, except as hereinafter provided, will be permitted on the pavement before a period of 10 days has elapsed after the concrete has been placed, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa. Concrete that fails to attain a modulus of rupture of 3.8 MPa within 10 days shall not be opened to traffic until directed by the Engineer.

• Equipment for sawing weakened plane joints will be permitted on the pavement as specified in Section 40-1.08B, "Weakened Plane Joints."

• When requested in writing by the Contractor, the tracks on one side of paving equipment will be permitted on the pavement after a modulus of rupture of 2.4 MPa has been attained, provided that:

A. Unit pressure exerted on the pavement by the paver shall not exceed 135 kPa;
B. Tracks with cleats, grousers, or similar protuberances shall be modified or shall travel on planks or equivalent protective material, so that the pavement is not damaged; and
C. No part of the track shall be closer than 0.3-m from the edge of pavement.

• In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.

• Damage to the pavement resulting from early use of pavement by the Contractor's equipment as provided above shall be repaired by the Contractor at the Contractor's expense.

• The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor's expense, shall furnish the material and whatever labor the Engineer may require.

## 90-9 COMPRESSIVE STRENGTH

### 90-9.01 GENERAL

• Concrete compressive strength requirements consist of a minimum strength that shall be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified in these specifications or the special provisions or are shown on the plans.

• The compressive strength of concrete will be determined from test cylinders that have been fabricated from concrete sampled in conformance with the requirements of California Test 539. Test cylinders will be molded and initially field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with the requirements of California Test 521. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.

• When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.

• When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State $14 for each in-place cubic meter of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State $20 for each in place cubic meter of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test that indicates a compressive strength of less than 85 percent of the specified 28-day compressive strength will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials."

• If the test result indicates that the compressive strength at the maximum curing age specified or allowed is below the specified strength, but is 85 percent or more of the specified strength, payments to the State as required above shall be made, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength of the concrete placed in the work meets or exceeds the specified 28-day compressive strength. If the test result indicates a compressive strength at the maximum curing age specified or allowed below 85 percent, the concrete represented by that test will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the concrete placed in the work are acceptable. If the evidence consists of tests made on cores taken from the work, the cores shall be obtained and tested in conformance with the requirements in ASTM Designation: C 42.

• No single compressive strength test shall represent more than 250 $m^3$.

• When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.

• When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.

• Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.

• Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 4 MPa greater than the specified 28-day compressive strength, and no individual cylinder shall have a strength less than the specified strength at the maximum age specified or allowed. Data contained in the report shall be from trial batches that were produced within one year of the proposed use of specified strength concrete in the project. Whenever air-entrainment is required, the air content of trial batches shall be equal to or greater than the air content specified for the concrete without reduction due to tolerances.

• Tests shall be performed in conformance with either the appropriate California Test methods or the comparable ASTM test methods. Equipment employed in testing shall be in good condition and shall be properly calibrated. If the tests are performed during the life of the contract, the Engineer shall be notified sufficiently in advance of performing the tests in order to witness the test procedures.

• The certified test data and trial batch test reports shall include the following information:

A. Date of mixing.
B. Mixing equipment and procedures used.
C. The size of batch in cubic meters and the mass, type, and source of all ingredients used.
D. Penetration of the concrete.
E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

• Certified test data and trial batch test reports shall be signed by an official of the firm that performed the tests.

• When approved by the Engineer, concrete from trial batches may be used in the work at locations where concrete of a lower quality is required and the concrete will be paid for as the type or class of concrete required at that location.

• After materials, mix proportions, mixing equipment, and procedures for concrete have been prequalified for use, additional prequalification by testing of trial batches will be required prior to making changes that, in the judgment of the Engineer, could result in a strength of concrete below that specified.

• The Contractor’s attention is directed to the time required to test trial batches and the Contractor shall be responsible for production of trial batches at a sufficiently early date so that the progress of the work is not delayed.

• When precast concrete members are manufactured at the plant of an established manufacturer of precast concrete members, the mix proportions of the concrete shall be determined by the Contractor, and a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures will not be required.

## 90-10 MINOR CONCRETE

### 90-10.01 GENERAL

• Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.

• The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

### 90-10.02 MATERIALS

• Minor concrete shall conform to the following requirements:

#### 90-10.02A Cementitious Material

• Cementitious material shall conform to the provisions in Section 90-1.01, "Description."

#### 90-10.02B Aggregate

• Aggregate shall be clean and free from deleterious coatings, clay balls, roots, and other extraneous materials.

• The Contractor shall submit to the Engineer for approval, a grading of the combined aggregate proposed for use in the minor concrete. After acceptance of the grading, aggregate furnished for minor concrete shall conform to that grading, unless a change is authorized in writing by the Engineer.

• The Engineer may require the Contractor to furnish periodic test reports of the aggregate grading furnished. The maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 37.5 mm or smaller than 19 mm.

• The Engineer may waive, in writing, the gradation requirements in this Section 90-10.02B, if, in the Engineer's opinion, the furnishing of the gradation is not necessary for the type or amount of concrete work to be constructed.

**90-10.02C Water**

- Water used for washing, mixing, and curing shall be free from oil, salts, and other impurities that would discolor or etch the surface or have an adverse affect on the quality of the concrete.

**90-10.02D Admixtures**

- The use of admixtures shall conform to the provisions in Section 90-4, "Admixtures."

**90-10.03 PRODUCTION**

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."
- The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.
- Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 32°C will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.
- The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.
- The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.
- Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.
- A Certificate of Compliance conforming to the provisions in Section 6–1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

**90-10.04 CURING MINOR CONCRETE**

- Curing minor concrete shall conform to the provisions in Section 90-7, "Curing Concrete."

**90-10.05 PROTECTING MINOR CONCRETE**

- Protecting minor concrete shall conform to the provisions in Section 90-8, "Protecting Concrete," except the concrete shall be maintained at a temperature of not less than 4°C for 72 hours after placing.

**90-10.06 MEASUREMENT AND PAYMENT**

- Minor concrete will be measured and paid for in conformance with the provisions specified in the various sections of these specifications covering concrete construction when minor concrete is specified in the specifications, shown on the plans, or indicated by contract item in the Engineer's Estimate.

## 90-11 MEASUREMENT AND PAYMENT

**90-11.01 MEASUREMENT**

- Portland cement concrete will be measured in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.
- When it is provided that concrete will be measured at the mixer, the volume in cubic meters shall be computed as the total mass of the batch in kilograms divided by the density of the concrete in kilograms per cubic meter. The total mass of the batch shall be calculated as the sum of all materials, including water, entering the batch. The density of the concrete will be determined in conformance with the requirements in California Test 518.

**90-11.02 PAYMENT**

- Portland cement concrete will be paid for in conformance with the provisions specified in the various sections of these specifications covering construction requiring concrete.
- Full compensation for furnishing and incorporating admixtures required by these specifications or the special provisions will be considered as included in the contract prices paid for the concrete involved and no additional compensation will be allowed therefor.
- Should the Engineer order the Contractor to incorporate any admixtures in the concrete when their use is not required by these specifications or the special provisions, furnishing the admixtures and adding them to the concrete will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."
- Should the Contractor use admixtures in conformance with the provisions in Section 90-4.05, "Optional Use of Chemical Admixtures," or Section 90-4.07, "Optional Use of Air-entraining Admixtures," or should the Contractor request and obtain permission to use other admixtures for the Contractor's benefit, the Contractor shall furnish those admixtures and incorporate them into the concrete at the Contractor's expense and no additional compensation will be allowed therefor.

# END OF AMENDMENTS

## SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

**2-1.01 GENERAL**

The bidder's attention is directed to the provisions in Section 2, "Proposal Requirements and Conditions," of the Standard Specifications and these special provisions for the requirements and conditions which the bidder must observe in the preparation of the Proposal form and the submission of the bid.

In addition to the subcontractors required to be listed in conformance with Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications, each proposal shall have listed therein the portion of work that will be performed by each subcontractor listed.

The Bidder's Bond form mentioned in the last paragraph in Section 2-1.07, "Proposal Guaranty," of the Standard Specifications will be found following the signature page of the Proposal.

Submit request for substitution of an "or equal" item, and the data substantiating the request to the Department of Transportation, Construction Division Chief, 100 South Main Street, MS-7, Los Angeles, CA 90012, so that the request is received by the Department by close of business on the fourth day, not including Saturdays, Sundays and legal holidays, following bid opening.

In conformance with Public Contract Code Section 7106, a Noncollusion Affidavit is included in the Proposal. Signing the Proposal shall also constitute signature of the Noncollusion Affidavit.

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate. Each subcontract signed by the bidder must include this assurance.

Failure of the bidder to fulfill the requirements of the Special Provisions for submittals required to be furnished after bid opening, including but not limited to DBE or DVBE submittals, or escrowed bid documents, where applicable, may subject the bidder to a determination of the bidder's responsibility in the event it is the apparent low bidder on a future public works contracts.

**2-1.015 FEDERAL LOBBYING RESTRICTIONS**

Section 1352, Title 31, United States Code prohibits Federal funds from being expended by the recipient or any lower tier subrecipient of a Federal-aid contract to pay for any person for influencing or attempting to influence a Federal agency or Congress in connection with the awarding of any Federal-aid contract, the making of any Federal grant or loan, or the entering into of any cooperative agreement.

If any funds other than Federal funds have been paid for the same purposes in connection with this Federal-aid contract, the recipient shall submit an executed certification and, if required, submit a completed disclosure form as part of the bid documents.

A certification for Federal-aid contracts regarding payment of funds to lobby Congress or a Federal agency is included in the Proposal. Standard Form - LLL, "Disclosure of Lobbying Activities," with instructions for completion of the Standard Form is also included in the Proposal. Signing the Proposal shall constitute signature of the Certification.

The above-referenced certification and disclosure of lobbying activities shall be included in each subcontract and any lower-tier contracts exceeding $100,000. All disclosure forms, but not certifications, shall be forwarded from tier to tier until received by the Engineer.

The Contractor, subcontractors and any lower-tier contractors shall file a disclosure form at the end of each calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed by the Contractor, subcontractors and any lower-tier contractors. An event that materially affects the accuracy of the information reported includes:

A. A cumulative increase of $25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or
B. A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action; or,
C. A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

**2-1.02 DISADVANTAGED BUSINESS ENTERPRISE (DBE)**

This project is subject to Part 26, Title 49, Code of Federal Regulations entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs." The Regulations in their entirety are incorporated herein by this reference.

Bidders shall be fully informed respecting the requirements of the Regulations and the Department's Disadvantaged Business Enterprise (DBE) program developed pursuant to the Regulations; particular attention is directed to the following matters:

A. A DBE must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act and relevant regulations promulgated pursuant thereto.
B. A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, vendor of material or supplies, or as a trucking company.
C. A DBE bidder, not bidding as a joint venture with a non-DBE, will be required to document one or a combination of the following:

    1. The bidder will meet the goal by performing work with its own forces.
    2. The bidder will meet the goal through work performed by DBE subcontractors, suppliers or trucking companies.
    3. The bidder, prior to bidding, made adequate good faith efforts to meet the goal.

D. A DBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DBE joint venture partner must share in the capital contribution, control, management, risks and profits of the joint venture. The DBE joint venturer must submit the joint venture agreement with the proposal or the DBE Information form required in the Section entitled "Submission of DBE Information" of these special provisions.
E. A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
F. DBEs must be certified by the California Unified Certification Program (CUCP). It is the contractor's responsibility to confirm that the firm is DBE certified as of the date of bid opening. Listings of DBEs certified by the CUCP are available from the following sources:

    1. The Department's DBE Directory, which is published quarterly. This Directory may be obtained from the Department of Transportation, Materiel Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520.
    2. The Department's web site at http://www.dot.ca.gov/hq/bep.
    3. The organizations listed in the Section entitled "DBE Goal for this Project" of these special provisions.

G. Credit for materials or supplies purchased from DBEs will be as follows:

    1. If the materials or supplies are obtained from a DBE manufacturer, 100 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract and of the general character described by the specifications.
    2. If the materials or supplies are purchased from a DBE regular dealer, 60 percent of the cost of the materials or supplies will count toward the DBE goal. A DBE regular dealer is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general

character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. To be a DBE regular dealer, the firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question. A person may be a DBE regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided in this paragraph G.2. if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis. Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not DBE regular dealers within the meaning of this paragraph G.2.

3. Credit for materials or supplies purchased from a DBE which is neither a manufacturer nor a regular dealer will be limited to the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, provided the fees are reasonable and not excessive as compared with fees charged for similar services.

H. Credit for DBE trucking companies will be as follows:

1. The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting the DBE goal.
2. The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
3. The DBE receives credit for the total value of the transportation services it provides on the contract using trucks its owns, insures, and operates using drivers it employs.
4. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.
5. The DBE may also lease trucks from a non-DBE firm, including an owner-operator. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The DBE does not receive credit for the total value of the transportation services provided by the lessee, since these services are not provided by a DBE.
6. For the purposes of this paragraph H, a lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

I. Noncompliance by the Contractor with the requirements of the regulations constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.
J. Bidders are encouraged to use services offered by financial institutions owned and controlled by DBEs.

**2-1.02A DBE GOAL FOR THIS PROJECT**

The Department has established the following goal for Disadvantaged Business Enterprise (DBE) participation for this project:

Disadvantaged Business Enterprise (DBE): 8 percent

Bidders may use the services of the following firms to contact interested DBEs. These firms are available to assist DBEs in preparing bids for subcontracting or supplying materials.

The following firms may be contacted for projects in the following locations:

| Districts 04, 05 (except San Luis Obispo and Santa Barbara Counties), 06 (except Kern County) and 10: | Districts 08 and 11: |
|---|---|
| See the Department's DBE database at: http://www.dot.ca.gov/hq/bep/ | Padilla & Associates<br>- San Diego<br><br>2725 Congress Street, Suite 1D<br>San Diego, CA 92110<br>Telephone: (619) 725-0843<br>FAX No.: (619) 725-0854 |

| Districts 07, 08, and 12; in San Luis Obispo and Santa Barbara Counties in District 05; and in Kern County in District 06: | Districts 01, 02, 03 and 09: |
|---|---|
| Padilla & Associates<br>- Commerce<br><br>5675 East Telegraph Rd., Suite A-260<br>Commerce, CA 90040<br>Telephone: (323) 728-8847<br>FAX No.: (323) 728-8867 | See the Department's DBE database at: http://www.dot.ca.gov/hq/bep/ |

**2-1.02B SUBMISSION OF DBE INFORMATION**

All bidders shall complete the "CALTRANS BIDDER - DBE INFORMATION" form included in the Proposal and submit it WITH THE BID.

Failure to submit the "CALTRANS BIDDER - DBE INFORMATION" form with the bid will be grounds for finding the bid nonresponsive.

The bidder shall submit written confirmation from each DBE that the DBE is participating in the contract, and include the confirmation with the submittal of the bid or submit it by the time specified for submittal of the GOOD FAITH EFFORT (GFE) DOCUMENTATION form. A copy of a DBE's quote will serve as written confirmation that the DBE is participating in the contract.

Where the bidder has not met the designated DBE goal, it must submit good faith efforts (GFE) documentation to establish that, prior to the bid, it made adequate good faith efforts to meet the goal.

Bidders are cautioned that even though their "CALTRANS BIDDER - DBE INFORMATION" form indicates they will meet the stated DBE goal, they should also submit their GFE documentation within the time specified herein, to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

The apparent successful bidder (low bidder), the second low bidder and the third low bidder shall complete and submit the GOOD FAITH EFFORT (GFE) DOCUMENTATION form, if they have not met the goal, to the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, California 95814 so the information is received by the Department no later than 4:00 p.m. ON THE FOURTH DAY, not including Saturdays, Sundays and legal holidays, following bid opening. GFE documentation sent by U.S. Postal Service certified mail with return receipt and certificate of mailing and mailed on or before the third day, not including Saturdays, Sundays and legal holidays, following bid opening will be accepted even if it is received after the fourth day following bid opening. Other bidders need not submit GFE documentation unless requested to do so by the Department. When a request is made by the Department, the GFE documentation of the other bidders shall be received by the Department within 4 days of the request, not including Saturdays, Sundays and legal holidays, unless a later time is authorized by the Department.

If it is determined that GFE documentation is needed to determine a bidder's eligibility for award, failure of the bidder to have submitted the GFE documentation by the time specified herein will be grounds for finding the bid or proposal nonresponsive.

It is the bidder's responsibility to make enough work available to DBEs and to select those portions of the work or material needs consistent with the available DBEs to meet the goal for DBE participation.

The bidder's "CALTRANS BIDDER - DBE INFORMATION" form shall include the names, addresses and phone numbers of DBE firms that will participate, with a complete description of work or supplies to be provided by each, and the dollar value of each DBE transaction. When 100 percent of a contract item of work is not to be performed or furnished by a DBE, a description of the exact portion of that work to be performed or furnished by that DBE shall be included in the DBE information, including the planned location of that work. The work that a DBE prime contractor has committed to

performing with its own forces as well as the work that it has committed to be performed by DBE subcontractors, suppliers and trucking companies will count toward the goal.

The bidder's good faith effort (GFE) documentation shall establish that good faith efforts to meet the DBE goal have been made.

In order to establish the bidder's good faith efforts to meet the DBE goal, the bidder should include the following information and supporting documents, as necessary:

A. Items of work the bidder has made available to DBE firms. Identify those items of work the bidder might otherwise perform with its own forces and those items that have been broken down into economically feasible units to facilitate DBE participation. For each item listed, show the dollar value and percentage of the total contract. It is the bidder's responsibility to demonstrate that sufficient work to meet the goal was made available to DBE firms.
B. The names of certified DBEs and the dates on which they were solicited to bid on the project. Include the items of work offered. Describe the methods used for following up initial solicitations to determine with certainty if the DBEs were interested, and the dates of the follow-up. Attach supporting documents such as copies of letters, memos, facsimiles sent, telephone logs, telephone billing statements, and other evidence of solicitation. Bidders are reminded to solicit certified DBEs through all reasonable and available means and provide sufficient time to allow DBEs to respond.
C. For each item of work made available, the DBEs that provided quotes, the selected firm and its status as a DBE, the price quote for each firm, and the name, address and telephone number for each firm. If the firm selected for the item is not a DBE, provide the reasons for the selection.
D. The names and dates of each publication in which a request for DBE participation for the project was placed by the bidder. Attach copies of the published advertisements.
E. The names of agencies, including the firms listed in Section 2-1.02A, "DBE Goal for this Project," and the dates on which they were contacted to provide assistance in contacting, recruiting and using DBE firms. If the agencies were contacted in writing, provide copies of supporting documents.
F. Descriptions of the efforts made to provide interested DBEs with adequate information about the plans, specifications and requirements of the contract to assist them in responding to a solicitation. Where the bidder has provided information, identify the name of the DBE assisted, the nature of the information provided, and date of contact. Provide copies of supporting documents, as appropriate.
G. Descriptions of any and all efforts made to assist interested DBEs in obtaining bonding, lines of credit, insurance, necessary equipment, supplies, and materials (excluding supplies and equipment which the DBE subcontractor purchases or leases from the prime contractor or its affiliate). Where such assistance was provided by the bidder, identify the name of the DBE assisted, nature of the assistance offered, and date. Provide copies of supporting documents, as appropriate.
H. Any additional data to support a demonstration of good faith efforts.

## SECTION 3. AWARD AND EXECUTION OF CONTRACT

The bidder's attention is directed to the provisions in Section 3, "Award and Execution of Contract," of the Standard Specifications and these special provisions for the requirements and conditions concerning award and execution of contract.

Bid protests are to be delivered to the following address: Department of Transportation, MS 43, Attn: Office Engineer, 1727 30th Street, Sacramento, CA 95816 or by facsimile to the Office Engineer at (916) 227-6282.

The award of the contract, if it be awarded, will be to the lowest responsible bidder whose proposal complies with all the requirements prescribed and who has met the goal for DBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so. Meeting the goal for DBE participation or demonstrating, to the satisfaction of the Department, adequate good faith efforts to do so is a condition for being eligible for award of contract.

The contract shall be executed by the successful bidder and shall be returned, together with the contract bonds, to the Department so that it is received within 10 days, not including Saturdays, Sundays and legal holidays, after the bidder has received the contract for execution. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address: Department of Transportation MS 43, Attn: Office Engineer, 1727 30th Street, Sacramento, CA 95816.

A "Payee Data Record" form will be included in the contract documents to be executed by the successful bidder. The purpose of the form is to facilitate the collection of taxpayer identification data. The form shall be completed and returned to the Department by the successful bidder with the executed contract and contract bonds. For the purposes of the form, payee shall be deemed to mean the successful bidder. The form is not to be completed for subcontractors or suppliers. Failure to complete and return the "Payee Data Record" form to the Department as provided herein will result in the retention of 31 percent of payments due the contractor and penalties of up to $20,000. This retention of payments for failure to complete the "Payee Data Record" form is in addition to any other retention of payments due the Contractor.

## SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES

Attention is directed to the provisions in Section 8-1.03, "Beginning of Work," in Section 8-1.06, "Time of Completion," and in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and these special provisions.

The Contractor shall furnish the Engineer with a statement from the vendor that the order for the sign panels and electrical materials required for this contract has been received and accepted by the vendor; and the statement shall be furnished within 15 calendar days after the contract has been approved by the Attorney General, or the attorney appointed and authorized to represent the Department of Transportation. The statement shall give the dates that the sign panels and electrical materials will be shipped. If the Contractor has the necessary materials on hand, the Contractor will not be required to furnish the vendor's statement.

The Contractor shall begin work within 15 calendar days after the contract has been approved by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation.

The work shall be diligently prosecuted to completion before the expiration of 925 **WORKING DAYS** beginning on the date that work begins, or beginning on the fifteenth calendar day after approval of the contract, whichever occurs first.

Second paragraph in Section 8-1.06, "Time of Completion," of the Standard Specifications shall not apply to this project.

A working day is defined as any day, except as follows:

(1) Days designated with "x" or "xx" in Table Z, "Lane Closure Restrictions for Designated Legal Holidays and Special Days" in "Maintaining Traffic" of these special provisions.

(2) Days on which the Contractor is prevented by inclement weather or conditions resulting immediately therefrom adverse to the current controlling operation or operations, as determined by the Engineer, from proceeding with at least 75 percent of the normal labor and equipment force engaged on that operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations.

The Contractor shall pay to the State of California the sum of $5,300 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

The 72 hours advance notice before beginning work specified in Section 8-1.03, "Beginning of Work," of the Standard Specifications is changed to 5 days advance notice for this project.

## SECTION 5. GENERAL

## SECTION 5-1. MISCELLANEOUS

### 5-1.01 PLANS AND WORKING DRAWINGS

When the specifications require working drawings to be submitted to the Division of Structure Design, the drawings shall be submitted to: Division of Structure Design, Documents Unit, Mail Station 9, 1801 30th Street, Sacramento, CA 95816, Telephone 916 227-8252.

### 5-1.011 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK

Attention is directed to "Differing Site Conditions" of these special provisions regarding physical conditions at the site which may differ from those indicated in "Materials Information," log of test borings or other geotechnical information obtained by the Department's investigation of site conditions.

### 5-1.012 DIFFERING SITE CONDITIONS

Attention is directed to Section 5-1.116, "Differing Site Conditions," of the Standard Specifications.

During the progress of the work, if subsurface or latent conditions are encountered at the site differing materially from those indicated in the "Materials Information," log of test borings, other geotechnical data obtained by the Department's investigation of subsurface conditions, or an examination of the conditions above ground at the site, the party discovering those conditions shall promptly notify the other party in writing of the specific differing conditions before they are disturbed and before the affected work is performed.

The Contractor will be allowed 15 days from the notification of the Engineer's determination of whether or not an adjustment of the contract is warranted, in which to file a notice of potential claim in conformance with the provisions of Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and as specified herein; otherwise the decision of the Engineer shall be deemed to have been accepted by the Contractor as correct. The notice of potential claim shall set forth in what respects the Contractor's position differs from the Engineer's determination and provide any additional information obtained by the Contractor, including but not limited to additional geotechnical data. The notice of potential claim shall be accompanied by the Contractor's certification that the following were made in preparation of the bid: a review of the

contract, a review of the "Materials Information," a review of the log of test borings and other records of geotechnical data to the extent they were made available to bidders prior to the opening of bids, and an examination of the conditions above ground at the site. Supplementary information, obtained by the Contractor subsequent to the filing of the notice of potential claim, shall be submitted to the Engineer in an expeditious manner.

**5-1.013 LINES AND GRADES**

Attention is directed to Section 5-1.07, "Lines and Grades," of the Standard Specifications.

Stakes or marks will be set by the Engineer in conformance with the requirements in Chapter 12, "Construction Surveys," of the Department's Surveys Manual.

**5-1.015 LABORATORY**

When a reference is made in the specifications to the "Laboratory," the reference shall mean Division of Engineering Services - Materials Engineering and Testing Services and Division of Engineering Services - Geotechnical Services of the Department of Transportation, or established laboratories of the various Districts of the Department, or other laboratories authorized by the Department to test materials and work involved in the contract. When a reference is made in the specifications to the "Transportation Laboratory," the reference shall mean Division of Engineering Services - Materials Engineering and Testing Services and Division of Engineering Services - Geotechnical Services, located at 5900 Folsom Boulevard, Sacramento, CA 95819, Telephone (916) 227-7000.

**5-1.017 CONTRACT BONDS**

Attention is directed to Section 3-1.02, "Contract Bonds," of the Standard Specifications and these special provisions.

The payment bond shall be in a sum not less than one hundred percent of the total amount payable by the terms of the contract.

**5-1.019 COST REDUCTION INCENTIVE**

Attention is directed to Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

Prior to preparing a written cost reduction proposal, the Contractor shall request a meeting with the Engineer to discuss the proposal in concept. Items of discussion will also include permit issues, impact on other projects, impact on the project schedule, peer reviews, overall merit of the proposal, and review times required by the Department and other agencies.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in contract time, 50 percent of that contract time reduction shall be credited to the State by reducing the contract working days, not including plant establishment. Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions regarding the working days.

If a cost reduction proposal submitted by the Contractor, and subsequently approved by the Engineer, provides for a reduction in traffic congestion or avoids traffic congestion during construction, 60 percent of the estimated net savings in construction costs attributable to the cost reduction proposal will be paid to the Contractor. In addition to the requirements in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications, the Contractor shall provide detailed comparisons of the traffic handling between the existing contract and the proposed change, and estimates of the traffic volumes and congestion.

**5-1.02 LABOR NONDISCRIMINATION**

Attention is directed to the following Notice that is required by Chapter 5 of Division 4 of Title 2, California Code of Regulations.

**NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM**

**(GOV. CODE, SECTION 12990)**

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.01A(4), "Labor Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt State contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The specifications are applicable to all nonexempt State construction contracts and subcontracts of $5000 or more.

**5-1.022 EXCLUSION OF RETENTION**

In conformance with 49 CFR, Part 26, Subpart B, Section 26.29 (b)(1), the retention of proceeds required by Public Contract Code Section 10261 shall not apply. In conformance with Public Contract Code 7200 (b), in subcontracts between the Contractor and a subcontractor and in subcontracts between a subcontractor and any subcontractor thereunder, retention proceeds shall not be withheld, and the exceptions provided in Public Contract Code 7200 (c) shall not apply. At the option

of the Contractor, subcontractors may be required to furnish payment and performance bonds issued by an admitted surety insurer.

The third paragraph of Section 9-1.06, "Partial Payments," of the Standard Specifications, and Section 9-1.065, "Payment of Withheld Funds," of the Standard Specifications shall not apply.

**5-1.023 UNSATISFACTORY PROGRESS**

If the number of working days charged to the contract exceeds 75 percent of the working days in the current time of completion and the percent working days elapsed exceeds the percent work completed by more than 15 percentage points, the Department will withhold 10 percent of the amount due on the current monthly estimate.

The percent working days elapsed will be determined from the number of working days charged to the contract divided by the number of contract working days in the current time of completion, expressed as a percentage. The number of contract working days in the current time of completion shall consist of the original contract working days increased or decreased by time adjustment s approved by the Engineer.

The percent work completed will be determined by the Engineer from the sum of payments made to date plus the amount due on the current monthly estimate, divided by the current total estimated value of the work, expressed as a percentage.

When the percent of working days elapsed minus the percent of work completed is less than or equal to 15 percentage points, the funds withheld shall be returned to the Contractor with the next monthly progress payment.

Funds kept or withheld from payment, due to the failure of the Contractor to comply with the provisions of the contract, will not be subject to the requirements of Public Contract Code 7107 or to the payment of interest pursuant to Public Contract Code Section 10261.5.

**5-1.03 INTEREST ON PAYMENTS**

Interest shall be payable on progress payments, payments after acceptance, final payments, extra work payments, and claim payments as follows:

A. Unpaid progress payments, payment after acceptance, and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
B. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in conformance with the provisions in Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
C. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments, and extra work payments shall be 10 percent per annum.
D. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

The rate of interest payable on any award in arbitration shall be 6 percent per annum if allowed under the provisions of Civil Code Section 3289.

**5-1.04 PUBLIC SAFETY**

The Contractor shall provide for the safety of traffic and the public in conformance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between a lane open to public traffic and an excavation, obstacle or storage area when the following conditions exist:

A. Excavations**.—**The near edge of the excavation is 3.6 m or less from the edge of the lane, except:

1. Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.
2. Excavations less than 0.3-m deep.
3. Trenches less than 0.3-m wide for irrigation pipe or electrical conduit, or excavations less than 0.3-m in diameter.
4. Excavations parallel to the lane for the purpose of pavement widening or reconstruction.
5. Excavations in side slopes, where the slope is steeper than 1:4 (vertical:horizontal).
6. Excavations protected by existing barrier or railing.

B. Temporarily Unprotected Permanent Obstacles.—The work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or the Contractor, for the Contractor's convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

C. Storage Areas.—Material or equipment is stored within 3.6 m of the lane and the storage is not otherwise prohibited by the provisions of the Standard Specifications and these special provisions.

The approach end of temporary railing (Type K), installed in conformance with the provisions in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications, shall be offset a minimum of 4.6 m from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than 0.3-m transversely to 3 m longitudinally with respect to the edge of the traffic lane. If the 4.6-m minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 1999 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

Temporary crash cushion modules shall conform to the provisions in "Temporary Crash Cushion Module" of these special provisions.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane unless otherwise provided in the Standard Specifications and these special provisions:

| Approach Speed of Public Traffic (Posted Limit) (Kilometers Per Hour) | Work Areas |
|---|---|
| Over 72 (45 Miles Per Hour) | Within 1.8 m of a traffic lane but not on a traffic lane |
| 56 to 72 (35 to 45 Miles Per Hour) | Within 0.9-m of a traffic lane but not on a traffic lane |

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of a traffic lane, the line of cones or delineators shall be considered to be the edge of the traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 3 m without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the provisions in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

## 5-1.05 TESTING

Testing of materials and work shall conform to the provisions in Section 6-3, "Testing," of the Standard Specifications and these special provisions.

Whenever the provisions of Section 6-3.01, "General," of the Standard Specifications refer to tests or testing, it shall mean tests to assure the quality and to determine the acceptability of the materials and work.

The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Department, and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

## 5-1.06 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

When the presence of asbestos or hazardous substances are not shown on the plans or indicated in the specifications and the Contractor encounters materials which the Contractor reasonably believes to be asbestos or a hazardous substance as defined in Section 25914.1 of the Health and Safety Code, and the asbestos or hazardous substance has not been rendered

harmless, the Contractor may continue work in unaffected areas reasonably believed to be safe. The Contractor shall immediately cease work in the affected area and report the condition to the Engineer in writing.

In conformance with Section 25914.1 of the Health and Safety Code, removal of asbestos or hazardous substances including exploratory work to identify and determine the extent of the asbestos or hazardous substance will be performed by separate contract.

If delay of work in the area delays the current controlling operation, the delay will be considered a right of way delay and the Contractor will be compensated for the delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

**5-1.07 (BLANK)**

**5-1.075 BUY AMERICA REQUIREMENTS**

Attention is directed to the "Buy America" requirements of the Surface Transportation Assistance Act of 1982 (Section 165) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Sections 1041(a) and 1048(a), and the regulations adopted pursuant thereto. In conformance with the law and regulations, all manufacturing processes for steel and iron materials furnished for incorporation into the work on this project shall occur in the United States; with the exception that pig iron and processed, pelletized and reduced iron ore manufactured outside of the United States may be used in the domestic manufacturing process for such steel and iron materials. The application of coatings, such as epoxy coating, galvanizing, painting, and other coatings that protect or enhance the value of steel or iron materials shall be considered a manufacturing process subject to the "Buy America" requirements.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for steel and iron materials. The certificates, in addition to certifying that the materials comply with the specifications, shall specifically certify that all manufacturing processes for the materials occurred in the United States, except for the above exceptions.

The requirements imposed by the law and regulations do not prevent a minimal use of foreign steel and iron materials if the total combined cost of the materials used does not exceed one-tenth of one percent (0.1 percent) of the total contract cost or $2500, whichever is greater. The Contractor shall furnish the Engineer acceptable documentation of the quantity and value of the foreign steel and iron prior to incorporating the materials into the work.

**5-1.08 SUBCONTRACTOR AND DBE RECORDS**

The Contractor shall maintain records showing the name and business address of each first-tier subcontractor. The records shall also show the name and business address of every DBE subcontractor, DBE vendor of materials and DBE trucking company, regardless of tier. The records shall show the date of payment and the total dollar figure paid to all of these firms. DBE prime contractors shall also show the date of work performed by their own forces along with the corresponding dollar value of the work.

Upon completion of the contract, a summary of these records shall be prepared on Form CEM-2402 (F) and certified correct by the Contractor or the Contractor's authorized representative, and shall be furnished to the Engineer. The form shall be furnished to the Engineer within 90 days from the date of contract acceptance. $10,000 will be withheld from payment until the Form CEM-2402 (F) is submitted. The amount will be returned to the Contractor when a satisfactory Form CEM-2402 (F) is submitted.

Prior to the fifteenth of each month, the Contractor shall submit documentation to the Engineer showing the amount paid to DBE trucking companies listed in the Contractor's DBE information. This monthly documentation shall indicate the portion of the revenue paid to DBE trucking companies which is claimed toward DBE participation. The Contractor shall also obtain and submit documentation to the Engineer showing the amount paid by DBE trucking companies to all firms, including owner-operators, for the leasing of trucks. The DBE who leases trucks from a non-DBE is entitled to credit only for the fee or commission it receives as a result of the lease arrangement. The records must confirm that the amount of credit claimed toward DBE participation conforms with Section 2-1.02, "Disadvantaged Business Enterprise," of these special provisions.

The Contractor shall also obtain and submit documentation to the Engineer showing the truck number, owner's name, California Highway Patrol CA number, and if applicable, the DBE certification number of the owner of the truck for all trucks used during that month for which DBE participation will be claimed. This documentation shall be submitted on Form CEM-2404 (F).

**5-1.083 DBE CERTIFICATION STATUS**

If a DBE subcontractor is decertified during the life of the project, the decertified subcontractor shall notify the Contractor in writing with the date of decertification. If a subcontractor becomes a certified DBE during the life of the project, the subcontractor shall notify the Contractor in writing with the date of certification. The Contractor shall furnish the written documentation to the Engineer.

Upon completion of the contract, Form CEM-2403 (F) indicating the DBE's existing certification status shall be signed and certified correct by the Contractor. The certified form shall be furnished to the Engineer within 90 days from the date of contract acceptance.

**5-1.086 PERFORMANCE OF DBE SUBCONTRACTORS AND SUPPLIERS**

The DBEs listed by the Contractor in response to the provisions in Section 2-1.02B, "Submission of DBE Information," and Section 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

Authorization to use other forces or sources of materials may be requested for the following reasons:

A. The listed DBE, after having had a reasonable opportunity to do so, fails or refuses to execute a written contract, when such written contract, based upon the general terms, conditions, plans and specifications for the project, or on the terms of such subcontractor's or supplier's written bid, is presented by the Contractor.
B. The listed DBE becomes bankrupt or insolvent.
C. The listed DBE fails or refuses to perform the subcontract or furnish the listed materials.
D. The Contractor stipulated that a bond was a condition of executing a subcontract and the listed DBE subcontractor fails or refuses to meet the bond requirements of the Contractor.
E. The work performed by the listed subcontractor is substantially unsatisfactory and is not in substantial conformance with the plans and specifications, or the subcontractor is substantially delaying or disrupting the progress of the work.
F. It would be in the best interest of the State.

The Contractor shall not be entitled to any payment for such work or material unless it is performed or supplied by the listed DBE or by other forces (including those of the Contractor) pursuant to prior written authorization of the Engineer.

**5-1.09 SUBCONTRACTING**

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, and Section 2, "Proposal Requirements and Conditions," and Section 3, "Award and Execution of Contract," of these special provisions.

Pursuant to the provisions of Section 1777.1 of the Labor Code, the Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations web site at:

http://www.dir.ca.gov/DLSE/Debar.html.

The provisions in the third paragraph of Section 8-1.01, "Subcontracting," of the Standard Specifications, that the Contractor shall perform with the Contractor's own organization contract work amounting to not less than 50 percent of the original contract price, is not changed by the Federal Aid requirement specified under "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor's own organization.

Each subcontract and any lower tier subcontract that may in turn be made shall include the "Required Contract Provisions Federal-Aid Construction Contracts" in Section 14 of these special provisions. This requirement shall be enforced as follows:

A. Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the contract.

In conformance with the Federal DBE regulations Sections 26.53(f)(1) and 26.53(f)(2) Part 26, Title 49 CFR:

A. The Contractor shall not terminate for convenience a DBE subcontractor listed in response to Section 2-1.02B, "Submission of DBE Information," and then perform that work with its own forces, or those of an affiliate without the written consent of the Department, and
B. If a DBE subcontractor is terminated or fails to complete its work for any reason, the Contractor will be required to make good faith efforts to substitute another DBE subcontractor for the original DBE subcontractor, to the extent needed to meet the contract goal.

The requirement in Section 2-1.02, "Disadvantaged Business Enterprise (DBE)," of these special provisions that DBEs must be certified on the date bids are opened does not apply to DBE substitutions after award of the contract.

### 5-1.10 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

Attention is directed to the provisions in Sections 10262 and 10262.5 of the Public Contract Code concerning prompt payment to subcontractors.

### 5-1.103 RECORDS

The Contractor shall maintain cost accounting records for the contract pertaining to, and in such a manner as to provide a clear distinction between, the following six categories of costs of work during the life of the contract:

A. Direct costs of contract item work.
B. Direct costs of changes in character in conformance with Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications.
C. Direct costs of extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.
D. Direct costs of work not required by the contract and performed for others.
E. Direct costs of work performed under a notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications.
F. Indirect costs of overhead.

Cost accounting records shall include the information specified for daily extra work reports in Section 9-1.03C, "Records," of the Standard Specifications. The requirements for furnishing the Engineer completed daily extra work reports shall only apply to work paid for on a force account basis.

The cost accounting records for the contract shall be maintained separately from other contracts, during the life of the contract, and for a period of not less than 3 years after the date of acceptance of the contract. If the Contractor intends to file claims against the Department, the Contractor shall keep the cost accounting records specified above until complete resolution of all claims has been reached.

### 5-1.11 PARTNERING

The State will promote the formation of a "Partnering" relationship with the Contractor in order to effectively complete the contract to the benefit of both parties. The purpose of this relationship is to maintain a cooperative communication and to mutually resolve conflicts at the lowest responsible management level.

The Contractor may request the formation of a "Partnering" relationship by submitting a request in writing to the Engineer after approval of the contract. If the Contractor's request for "Partnering" is approved by the Engineer, scheduling of a "Partnering Workshop," selecting the "Partnering" facilitator and workshop site, and other administrative details shall be as agreed to by both parties. If agreed to by the parties, additional "Partnering Workshops" will be conducted as needed throughout the life of the contract.

A one-day "Training in Partnering Concepts" session will be conducted regardless of whether the Contractor requests the formation of a "Partnering" relationship. The "Training in Partnering Concepts" session will be conducted locally for the Contractor's and the Engineer's project representatives. The Contractor shall be represented by a minimum of 2 representatives, one being the Contractor's authorized representative pursuant to Section 5-1.06, "Superintendence," of the Standard Specifications. Scheduling of the "Training in Partnering Concepts" session and selection of the trainer and training site shall be determined cooperatively by the Contractor and the Engineer. If, upon the Contractor's request, "Partnering" is approved by the Engineer, the "Training in Partnering Concepts" session shall be conducted prior to the initial "Partnering Workshop."

The costs involved in providing the "Training in Partnering Concepts" trainer and training site will be borne entirely by the State. The costs will be determined in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor the sum of that cost, except no markups will be allowed.

The costs involved in providing the "Partnering Workshop" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Partnering Workshop" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with "Training in Partnering Concepts" and "Partnering Workshops" will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

The establishment of a "Partnering" relationship will not change or modify the terms and conditions of the contract and will not relieve either party of the legal requirements of the contract.

## 5-1.114 VALUE ANALYSIS

The Contractor may submit to the Engineer, in writing, a request for a "Value Analysis" workshop. The purpose for having a workshop is to identify value enhancing opportunities and to consider modifications to the plans and specifications that will reduce either the total cost, time of construction or traffic congestion, without impairing, in any manner, the essential functions or characteristics of the project including, but not limited to, service life, economy of operation, ease of maintenance, benefits to the travelling public, desired appearance, or design and safety standards.

To maximize the potential benefits of a workshop, the request should be submitted to the Engineer early in the project after approval of the contract. If the Contractor's request for a "Value Analysis" workshop is approved by the Engineer, scheduling of a workshop, selecting the facilitator and workshop site, and other administrative details shall be determined cooperatively by the Contractor and the Engineer.

The workshop shall be conducted in conformance with the methodology described in the Department's "Value Analysis Team Guide" available at the Department's web site at:

http://www.dot.ca.gov/hq/oppd/value/

The facilitator shall be a Certified Value Specialist (CVS) as recognized by the Society of American Value Engineers (SAVE) International, which may be contacted as follows:

SAVE International, 60 Revere Drive, Northbrook, IL 60062
Telephone 1-847-480-1730, FAX 1-847-480-9282

The Contractor may submit recommendations resulting from a "Value Analysis" workshop for approval by the Engineer as cost reduction incentive proposals in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

The costs involved in providing the "Value Analysis" facilitator and workshop site will be borne equally by the State and the Contractor. The division of cost will be made by determining the cost in providing the "Value Analysis" facilitator and workshop site in conformance with the provisions in Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost, except no markups will be allowed.

All other costs associated with the "Value Analysis" workshop will be borne separately by the party incurring the costs, such as wages and travel expenses, and no additional compensation will be allowed therefor.

## 5-1.12 DISPUTE REVIEW BOARD

### GENERAL

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Dispute Review Board, hereinafter referred to as the "DRB," shall be established by the Engineer and Contractor cooperatively upon approval of the contract. The DRB is intended to assist the contract administrative claims resolution process as specified in the provisions in Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The DRB shall not serve as a substitute for provisions in the specifications in regard to filing potential claims. The requirements and procedures established in this section shall be a prerequisite to filing a claim, filing for arbitration, or filing for litigation prior or subsequent to project completion.

The DRB shall be utilized when dispute or potential claim resolution at the project level is unsuccessful. The DRB shall function as specified herein until the day of acceptance of the contract, at which time the work of the DRB will cease except for completion of unfinished reports. No DRB dispute meetings shall take place later than 30 days prior to acceptance of contract. After acceptance of contract, disputes or potential claims which have followed the dispute resolution processes of the Standard Specifications and these special provisions, but have not been resolved, shall be stated or restated by the Contractor, in response to the Proposed Final Estimate within the time limits provided in Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications. The State will review those claims in conformance with the provisions in Section 9-1.07B of the Standard Specifications. Following the adherence to and completion of the contractual administrative claims procedure, the Contractor may file for arbitration in conformance with the provisions in Section 9-1.10, "Arbitration," of the Standard Specifications and these special provisions.

Disputes, as used in this section, shall include differences of opinion, properly noticed as provided hereinafter, between the State and Contractor on matters related to the work and other subjects considered by the State or Contractor, or by both, to be of concern to the DRB on this project, except matters relating to Contractor, subcontractor or supplier potential claims not actionable against the Department as specified in these special provisions or quantification of disputes for overhead type expenses or costs. Disputes for overhead type expenses or costs shall conform to the requirements of Section 9-1.07B, "Final

Payment and Claims," of the Standard Specifications. Whenever the term "dispute" or "disputes" is used herein, it shall be deemed to include potential claims as well as disputes.

The DRB shall serve as an advisory body to assist in the resolution of disputes between the State and the Contractor, hereinafter referred to as the "parties." The DRB shall consider disputes referred to it, and furnish written reports containing findings and recommendations pertaining to those disputes, to the parties to aid in resolution of the differences between them. DRB findings and recommendations are not binding on the parties.

**SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS**

The DRB shall consist of one member selected by the State and approved by the Contractor, one member selected by the Contractor and approved by the State, and a third member selected by the first 2 members and approved by both the State and the Contractor. The third member shall act as the DRB Chairperson.

DRB members shall be especially knowledgeable in the type of construction and contract documents potentially anticipated by the contract. DRB members shall discharge their responsibilities impartially as an independent body, considering the facts and circumstances related to the matters under consideration, pertinent provisions of the contract and applicable laws and regulations.

The State and the Contractor shall nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions, within 45 days of the approval of the contract. Each party shall provide written notification to the other of the name of their selected DRB nominee along with the prospective member's complete written disclosure statement.

Disclosure statements shall include a resume of the prospective member's experience and a declaration statement describing past, present, anticipated, and planned relationships, including indirect relationships through the prospective member's primary or full-time employer, to this project and with the parties involved in this construction contract, including but not limited to, relevant subcontractors or suppliers to the parties, parties' principals, or parties' counsel. DRB members shall also include a full disclosure of close professional or personal relationships with all key members of the contract. Objections to nominees must be based on a specific breech or violation of nominee responsibilities or on nominee qualifications under these provisions unless otherwise specified. The Contractor or the State may, on a one-time basis, object to the other's nominee without specifying a reason and this person will not be selected for the DRB. Another person shall then be nominated within 15 days.

The first duty of the State and Contractor selected members of the DRB shall be to select and recommend a prospective third DRB member to the parties for final selection and approval. The first 2 DRB members shall proceed with the selection of the third DRB member immediately upon receiving written notification from the State of their selection, and shall provide their recommendation simultaneously to the parties within 15 days of the notification.

The first 2 DRB members shall select a third DRB member subject to mutual approval of the parties or may mutually concur on a list of potentially acceptable third DRB members and submit the list to the parties for final selection and approval of the third member. The goal in the selection of the third member is to complement the professional experience of the first 2 members and to provide leadership for the DRB's activities.

The third prospective DRB member shall supply a full disclosure statement to the first 2 DRB members and to the parties prior to appointment.

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 15 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 DRB members are unable to agree upon a recommendation within their 15 day time limit. In the event of an impasse in selection of third DRB member the State and the Contractor shall each propose 3 candidates for the third DRB member position. The parties shall select the candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first 2 DRB members shall then select one of the 6 proposed candidates in a blind draw.

No DRB member shall have prior direct involvement in this contract. No member shall have a financial interest in this contract or the parties thereto, within a period of 6 months prior to award of this contract or during the contract, except as follows:

A. Compensation for services on this DRB.
B. Ownership interest in a party or parties, documented by the prospective DRB member, that has been reviewed and determined in writing by the State to be sufficiently insignificant to render the prospective member acceptable to the State.
C. Service as a member of other Dispute Review Boards on other contracts.
D. Retirement payments or pensions received from a party that are not tied to, dependent on or affected by the net worth of the party.
E. The above provisions apply to parties having a financial interest in this contract, including but not limited to contractors, subcontractors, suppliers, consultants, and legal and business services.

The Contractor or the State may reject any of the three DRB members who fail to fully comply at all times with all required employment and financial disclosure conditions of DRB membership as described in the Dispute Review Board Agreement and as specified herein. A copy of the Dispute Review Board Agreement is included in this section.

The Contractor, the State, and the 3 members of the DRB shall complete and adhere to the Dispute Review Board Agreement in administration of this DRB within 15 days of the parties' concurrence in the selection of the third member. No DRB meeting shall take place until the Dispute Review Board Agreement has been signed by all parties. The State authorizes the Engineer to execute and administer the terms of the Agreement. The person(s) designated by the Contractor as authorized to execute contract change orders shall be authorized to execute and administer the terms of this agreement, or to delegate the authority in writing. The operation of the DRB shall be in conformance with the terms of the Dispute Review Board Agreement.

**COMPENSATION**

The State and the Contractor shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of $1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of $700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time, (such as time spent evaluating and preparing recommendations on specific issues presented to the DRB), has been specifically agreed to in advance by the State and Contractor. Time away from the project, which has been specifically agreed to in advance by the parties, will be compensated at an agreed rate of $125 per hour. The agreed amount of $125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the Department, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The State will provide, at no cost to the Contractor, administrative services such as conference facilities and secretarial services to the DRB. These special provisions and the Dispute Review Board Agreement state the provisions for compensation and expenses of the DRB. DRB members shall be compensated at the same daily and hourly rate. The Contractor shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The State will reimburse the Contractor for the State's share of the costs. There will be no markups applied to expenses connected with the DRB, either by the DRB members or by the Contractor when requesting payment of the State's share of DRB expenses. Regardless of the DRB recommendation, neither party shall be entitled to reimbursement of DRB costs from the other party.

**REPLACEMENT OF DRB MEMBERS**

Service of a DRB member may be terminated at any time with not less than 15 days notice as follows:

A. The State may terminate service of the State appointed member.
B. The Contractor may terminate service of the Contractor appointed member.
C. Upon the written recommendation of the State and Contractor appointed members for the removal of the third member.
D. Upon resignation of a member.
E. The State or Contractor may terminate the service of any member who fails to fully comply with all required employment and financial disclosure conditions of DRB membership

When a member of the DRB is replaced, the replacement member shall be appointed in the same manner as the replaced member was appointed. The appointment of a replacement DRB member will begin promptly upon determination of the need for replacement and shall be completed within 15 days. Changes in either of the DRB members chosen by the two parties will not require re-selection of the third member, unless both parties agree to such re-selection in writing. The Dispute Review Board Agreement shall be amended to reflect the change of a DRB member.

**OPERATION**

The following procedure shall be used for dispute resolution:

A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard

Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.

B. The Engineer will respond, in writing, to the Contractor's written supplemental notice of potential claim within 20 days of receipt of the notice.

C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.

D. Following an objection to the Engineer's written response, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written response from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.

E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the Engineer's written response to the supplemental notice of potential claim, the Contractor waives future claims and arbitration on the matter in contention.

F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB shall not consider evidence not furnished in conformance with the terms specified herein.

G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB dispute meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a timely hearing of the dispute.

H. There shall be no participation of either party's attorneys at DRB dispute meetings.

I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.

J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within 10 days of the DRB request. The DRB shall complete its report, including minority opinion, if any, and submit it to the parties within 30 days of the DRB dispute meeting, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, pertinent provisions of the contract, applicable laws and regulations, and actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute and, if appropriate, recommend guidelines for determining compensation.

K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received from both parties, the DRB shall provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB shall consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.

L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.

M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.
N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.
O. The State and Contractor shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.
P. The DRB members shall have no claim against the State or the Contractor, or both, from claimed harm arising out of the parties' evaluations of the DRB's report.

**DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS**

For purposes of this section, a "subcontractor potential claim" shall include any potential claim by a subcontractor (including also any pass through potential claims by a lower tier subcontractor or supplier) against the Contractor that is actionable by the Contractor against the Department which arises from the work, services, or materials provided or to be provided in connection with the contract. If the Contractor determines to pursue a dispute against the Department that includes a subcontractor potential claim, the dispute shall be processed and resolved in conformance with these special provisions and in conformance with the following:

A. The Contractor shall identify clearly in submissions pursuant to this section, that portion of the dispute that involves a subcontractor potential claim or potential claims.
B. The Contractor shall include, as part of its submission pursuant to Step D above, a certification (False Claims Act Certification) by the subcontractor's or supplier's officer, partner, or authorized representative with authority to bind the subcontractor and with direct knowledge of the facts underlying the subcontractor potential claim. The Contractor shall submit a certification that the subcontractor potential claim is acknowledged and forwarded by the Contractor. The form for these certifications is available from the Engineer.
C. At DRB dispute meetings involving one or more subcontractor potential claims, the Contractor shall require that each subcontractor involved in the dispute have present an authorized representative with actual knowledge of the facts underlying the subcontractor potential claim to assist in presenting the subcontractor potential claim and to answer questions raised by the DRB members or the Department's representatives.
D. Failure by the Contractor to declare a subcontractor potential claim on behalf of its subcontractor (including lower tier subcontractors' and suppliers' pass through potential claims) at the time of submission of the Contractor's potential claims, as provided hereunder, shall constitute a release of the State by the Contractor of such subcontractor potential claim.
E. The Contractor shall include in all subcontracts under this contract that subcontractors and suppliers of any tier (a) agree to submit subcontractor potential claims to the Contractor in a proper form and in sufficient time to allow processing by the Contractor in conformance with the Dispute Review Board resolution specifications; (b) agree to be bound by the terms of the Dispute Review Board provisions to the extent applicable to subcontractor potential claims; (c) agree that, to the extent a subcontractor potential claim is involved, completion of all steps required under these Dispute Review Board special provisions shall be a condition precedent to pursuit by the subcontractor of other remedies permitted by law, including without limitation of a lawsuit against the Contractor; and (d) agree that the existence of a dispute resolution process for disputes involving subcontractor potential claims shall not be deemed to create any claim, right, or cause of action by any subcontractor or supplier against the Department.

Notwithstanding the foregoing, this Dispute Review Board special provision shall not apply to, and the DRB shall not have the authority to consider, subcontractor potential claims between the subcontractor(s) or supplier(s) and the Contractor that are not actionable by the Contractor against the Department.

**RETENTION**

Failure of the Contractor to nominate and approve DRB members in conformance with the terms and conditions of the Dispute Review Board Agreement and these special provisions shall result in the retention of 25 percent of the estimated value of all work performed during each estimate period in which the Contractor fails to comply with the requirements of this section as determined by the Engineer. DRB retentions will be released for payment on the next monthly estimate for partial payment following the date that the Contractor has nominated and approved DRB members and no interest will be due the Contractor.

**DISPUTE REVIEW BOARD AGREEMENT**

A copy of the "Dispute Review Board Agreement" to be executed by the Contractor, State and the 3 DRB members after approval of the contract follows:

Form 6202 Rev (09/01/02)

**DISPUTE REVIEW BOARD AGREEMENT**

_____
(Contract Identification)

Contract No. _____

**THIS DISPUTE REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT"**, made and entered into this _____ day of _____, _____, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE," _____ _____ hereinafter called the "CONTRACTOR," and the Dispute Review Board, hereinafter called the "DRB" consisting of the following members:

_____ ,
(Contractor Appointee)

_____ ,
(State Appointee)

and _____
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties," are now engaged in the construction on the State Highway project referenced above; and

WHEREAS, the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

**SECTION I DESCRIPTION OF WORK**

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

**SECTION II SCOPE OF WORK**

The scope of work of the DRB includes, but is not limited to, the following:

**A. OBJECTIVE**

The principal objective of the DRB is to assist in the timely resolution of disputes between the parties arising from performance of this contract. It is not intended for either party to default on their normal responsibility to amicably and fairly settle their differences by indiscriminately assigning them to the DRB. It is intended that the mere existence of the DRB will encourage the parties to resolve disputes without resorting to this review procedure. But when a dispute that is serious enough to warrant the DRB's review does develop, the process for prompt and efficient action will be in place.

**B. PROCEDURES**

The DRB shall render written reports on disputes between the parties arising from the construction contract. Prior to consideration of a dispute, the DRB shall establish rules and regulations that will govern the conduct of its business and reporting procedures in conformance with the requirements of the contract and the terms of this AGREEMENT. DRB recommendations, resulting from its consideration of a dispute, shall be furnished in writing to both parties. The recommendations shall be based on facts and circumstances involved in the dispute, pertinent contract provisions, applicable laws and regulations. The recommendations shall find one responsible party in a dispute; shared or "jury" determinations shall not be rendered. The DRB shall make recommendations on the merit of the dispute, and if appropriate, recommend guidelines for determining compensation. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

The DRB shall refrain from officially giving advice or consulting services to anyone involved in the contract. The individual members shall act in a completely independent manner and while serving as members of the DRB shall have no consulting business connections with either party or its principals or attorneys or other affiliates (subcontractors, suppliers, etc.) who have a beneficial interest in the contract.

During scheduled meetings of the DRB as well as during dispute meetings, DRB members shall refrain from expressing opinions on the merits of statements on matters under dispute or potential dispute. Opinions of DRB members expressed in private sessions shall be kept strictly confidential. Individual DRB members shall not meet with, or discuss contract issues with individual parties, except as directed by the DRB Chairperson. Such discussions or meetings shall be disclosed to both parties. Other discussions regarding the project between the DRB members and the parties shall be in the presence of all three members and both parties. Individual DRB members shall not undertake independent investigations of any kind pertaining to disputes or potential disputes, except with the knowledge of both parties and as expressly directed by the DRB Chairperson.

**C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS**

The DRB members shall visit the project site and meet with representatives of the parties to keep abreast of construction activities and to develop familiarity with the work in progress. Scheduled progress meetings shall be held at or near the project site. The DRB shall meet at least once at the start of the project, and at least once every 4 months thereafter. The frequency, exact time, and duration of additional site visits and progress meetings shall be as recommended by the DRB and approved by the parties consistent with the construction activities or matters under consideration and dispute. Each meeting shall consist of a round table discussion and a field inspection of the work being performed on the contract, if necessary. Each meeting shall be attended by representatives of both parties. The agenda shall generally be as follows:

1. Meeting opened by the DRB Chairperson.
2. Remarks by the STATE's representative.
3. A description by the CONTRACTOR's representative of work accomplished since the last meeting; the current schedule status of the work; and a forecast for the coming period.
4. An outline by the CONTRACTOR's representative of potential problems and a description of proposed solutions.
5. An outline by the STATE's representative of the status of the work as the STATE views it.
6. A brief description by the CONTRACTOR's or STATE's representative of potential claims or disputes which have surfaced since the last meeting.
7. A summary by the STATE's representative, the CONTRACTOR's representative, or the DRB of the status of past disputes and potential claims.

The STATE's representative will prepare minutes of all progress meetings and circulate them for revision and approval by all concerned within 10 days of the meeting.

The field inspection shall cover all active segments of the work, the DRB being accompanied by both parties' representatives. The field inspection may be waived upon mutual agreement of the parties.

**D. DRB CONSIDERATION AND HANDLING OF DISPUTES**

Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral, unless otherwise agreed to by all parties. The DRB shall determine the time and location of DRB dispute meetings, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of speedy resolution of issues. No dispute meetings shall take place later than 30 days prior to acceptance of contract.

Normally, dispute meetings shall be conducted at or near the project site. However, any location that would be more convenient and still provide required facilities and access to necessary documentation shall be satisfactory.

Both parties shall be given the opportunity to present their evidence at these dispute meetings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, applicable laws and regulations, and the facts and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

The DRB may request that written documentation and arguments from both parties be sent to each DRB member, through the DRB Chairperson, for review before the dispute meeting begins. A party furnishing written documentation to the DRB shall furnish copies of such information to the other party at the same time that such information is supplied to the DRB.

DRB dispute meetings shall be informal. There shall be no testimony under oath or cross-examination. There shall be no reporting of the procedures by a shorthand reporter or by electronic means. Documents and verbal statements shall be received by the DRB in conformance with acceptance standards established by the DRB. These standards need not comply with prescribed legal laws of evidence.

The third DRB member shall act as Chairperson for dispute meetings and all other DRB activities. The parties shall have a representative at all dispute meetings. Failure to attend a duly noticed dispute meeting by either of the parties shall be conclusively considered by the DRB as indication that the non-attending party considers written submittals as their entire and complete argument. The claimant shall discuss the dispute, followed by the other party. Each party shall then be allowed one or more rebuttals until all aspects of the dispute are thoroughly covered. DRB members shall ask questions, seek clarification, and request further data from either of the parties as may be necessary to assist in making a fully informed recommendation. The DRB may request from either party documents or information that would assist the DRB in making its findings and recommendations including, but not limited to, documents used by the CONTRACTOR in preparing the bid for the project. A refusal by a party to provide information requested by the DRB may be considered by the DRB as an indication that the requested material would tend to disprove that party's position. In large or complex cases, additional dispute meetings may be necessary in order to consider all the evidence presented by both parties. All involved parties shall maintain the confidentiality of all documents and information, as provided in this AGREEMENT.

During dispute meetings, no DRB member shall express an opinion concerning the merit of any facet of the case. DRB deliberations shall be conducted in private, with interim individual views kept strictly confidential.

After dispute meetings are concluded, the DRB shall meet in private and reach a conclusion supported by 2 or more members. Private sessions of the DRB may be held at a location other than the job site or by electronic conferencing as deemed appropriate, in order to expedite the process.

The DRB's findings and recommendations, along with discussion of reasons therefor, shall then be submitted as a written report to both parties. Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and facts and circumstances related to the dispute. The report shall be thorough in discussing the facts considered, the contract language, law or regulation viewed by the DRB as pertinent to the issues, and the DRB's interpretation and philosophy in arriving at its conclusions and recommendations. The DRB's report shall stand on its own, without attachments or appendices. The DRB Chairperson shall furnish a copy of the written recommendation report to the DRB Coordinator, Division of Construction, MS 44, P.O. Box 942874, Sacramento, CA 94274.

With prior written approval of both parties, the DRB may obtain technical services necessary to adequately review the disputes presented, including audit, geotechnical, schedule analysis and other services. The parties' technical staff may supply those services as appropriate. The cost of technical services, as agreed to by the parties, shall be borne equally by the 2 parties as specified in an approved contract change order. The CONTRACTOR will not be entitled to markups for the payments made for these services.

The DRB shall resist submittal of incremental portions of information by either party, in the interest of making a fully informed decision and recommendation.

The DRB shall make every effort to reach a unanimous decision. If this proves impossible, the dissenting member shall prepare a minority opinion, which shall be included in the DRB's report.

Although both parties should place weight upon the DRB's recommendations, they are not binding. Either party may appeal a recommendation to the DRB for reconsideration. However, reconsideration shall only be allowed when there is new evidence to present, and the DRB shall accept only one appeal from each party pertaining to an individual DRB recommendation. The DRB shall hear appeals in conformance with the terms described in the Section entitled "Dispute Review Board" in the special provisions.

**E. DRB MEMBER REPLACEMENT**

Should the need arise to appoint a replacement DRB member, the replacement DRB member shall be appointed in the same manner as the original DRB members were appointed. The selection of a replacement DRB member shall begin promptly upon notification of the necessity for a replacement and shall be completed within 15 days. This AGREEMENT shall be amended to indicate change in DRB membership.

**SECTION III CONTRACTOR RESPONSIBILITIES**

The CONTRACTOR shall furnish to each DRB member one copy of pertinent documents that are or may become necessary for the DRB to perform their function. Pertinent documents are written notices of potential claim, responses to those notices, drawings or sketches, calculations, procedures, schedules, estimates, or other documents which are used in the performance of the work or in justifying or substantiating the CONTRACTOR's position. The CONTRACTOR shall also furnish a copy of such pertinent documents to the STATE, in conformance with the terms outlined in the special provisions.

**SECTION IV STATE RESPONSIBILITIES**

The STATE will furnish the following services and items:

**A. CONTRACT RELATED DOCUMENTS**

The STATE will furnish to each DRB member one copy of Notice to Contractors and Special Provisions, Proposal and Contract, Plans, Standard Specifications, and Standard Plans, change orders, written instructions issued by the STATE to the CONTRACTOR, or other documents pertinent to any dispute that has been referred to the DRB and necessary for the DRB to perform its function.

**B. COORDINATION AND SERVICES**

The STATE, through the Engineer, will, in cooperation with the CONTRACTOR, coordinate the operations of the DRB. The Engineer will arrange or provide conference facilities at or near the project site and provide secretarial and copying services to the DRB without charge to the CONTRACTOR.

**SECTION V TIME FOR BEGINNING AND COMPLETION**

Once established, the DRB shall be in operation until the day of acceptance of the contract. The DRB members shall not begin work under the terms of this AGREEMENT until authorized in writing by the STATE.

**SECTION VI PAYMENT**

**A. ALL INCLUSIVE RATE PAYMENT**

The STATE and the CONTRACTOR shall bear the costs and expenses of the DRB equally. Each DRB member shall be compensated at an agreed rate of $1,200 per day if time spent per meeting, including on-site time plus one hour of travel time, is greater than 4 hours. Each DRB member shall be compensated at an agreed rate of $700 per day if time spent per meeting, including on-site time plus one hour of travel time, is less than or equal to 4 hours. The agreed rates shall be considered full compensation for on-site time, travel expenses, transportation, lodging, time for travel and incidentals for each day, or portion thereof, that the DRB member is at an authorized DRB meeting. No additional compensation will be made for time spent by DRB members in review and research activities outside the official DRB meetings unless that time has been specifically agreed to in advance by the STATE and CONTRACTOR. Time away from the project that has been specifically agreed to in advance by the parties will be compensated at an agreed rate of $125 per hour. The agreed amount of $125 per hour shall include all incidentals including expenses for telephone, fax, and computer services. Members serving on more than one DRB involving the State, regardless of the number of meetings per day, shall not be paid more than the all inclusive rate per day or rate per hour for an individual project. The STATE will provide, at no cost to the CONTRACTOR, administrative services such as conference facilities and secretarial services to the DRB.

**B. PAYMENTS**

DRB members shall be compensated at the same rate. The CONTRACTOR shall make direct payments to each DRB member for their participation in authorized meetings and approved hourly rate charges from invoices submitted by each DRB member. The STATE will reimburse the CONTRACTOR for its share of the costs of the DRB.

The DRB members may submit invoices to the CONTRACTOR for partial payment for work performed and services rendered for their participation in authorized meetings not more often than once per month during the progress of the work. The invoices shall be in a format approved by the parties and accompanied by a general description of activities performed during that billing period. Payment for hourly fees, at the agreed rate, shall not be paid to a DRB member until the amount and extent of those fees are approved by the STATE and CONTRACTOR.

Invoices shall be accompanied by original supporting documents, which the CONTRACTOR shall include with the extra work billing when submitting for reimbursement of the STATE's share of cost from the STATE. The CONTRACTOR will be reimbursed for one-half of approved costs of the DRB. No markups will be added to the CONTRACTOR's payment.

**C. INSPECTION OF COSTS RECORDS**

The DRB members and the CONTRACTOR shall keep available for inspection by representatives of the STATE and the United States, for a period of 3 years after final payment, the cost records and accounts pertaining to this AGREEMENT. If

any litigation, claim, or audit arising out of, in connection with, or related to this contract is initiated before the expiration of the 3-year period, the cost records and accounts shall be retained until such litigation, claim, or audit involving the records is completed.

**SECTION VII ASSIGNMENT OF TASKS OF WORK**

The DRB members shall not assign the work of this AGREEMENT.

**SECTION VIII TERMINATION OF DRB MEMBERS**

DRB members may resign from the DRB by providing not less than 15 days written notice of the resignation to the STATE and CONTRACTOR. DRB members may be terminated by their original appointing power or by either party, for failing to fully comply at all times with all required employment and financial disclosure conditions of DRB membership in conformance with the terms of the contract.

**SECTION IX LEGAL RELATIONS**

The parties hereto mutually understand and agree that the DRB member in the performance of duties on the DRB, is acting in the capacity of an independent agent and not as an employee of either party.

No party to this AGREEMENT shall bear a greater responsibility for damages or personal injury than is normally provided by Federal or State of California Law.

Notwithstanding the provisions of this contract that require the CONTRACTOR to indemnify and hold harmless the STATE, the parties shall jointly indemnify and hold harmless the DRB members from and against all claims, damages, losses, and expenses, including but not limited to attorney's fees, arising out of and resulting from the findings and recommendations of the DRB.

**SECTION X CONFIDENTIALITY**

The parties hereto mutually understand and agree that all documents and records provided by the parties in reference to issues brought before the DRB, which documents and records are marked "Confidential - for use by the DRB only," shall be kept in confidence and used only for the purpose of resolution of subject disputes, and for assisting in development of DRB findings and recommendations; that such documents and records will not be utilized or revealed to others, except to officials of the parties who are authorized to act on the subject disputes, for any purposes, during the life of the DRB. Upon termination of this AGREEMENT, said confidential documents and records, and all copies thereof, shall be returned to the parties who furnished them to the DRB. However, the parties understand that such documents shall be subsequently discoverable and admissible in court or arbitration proceedings unless a protective order has been obtained by the party seeking further confidentiality.

**SECTION XI DISPUTES**

Disputes between the parties hereto, including disputes between the DRB members and either party or both parties, arising out of the work or other terms of this AGREEMENT, which cannot be resolved by negotiation and mutual concurrence between the parties, or through the administrative process provided in the contract, shall be resolved by arbitration as provided in Section 9-1.10, "Arbitration," of the Standard Specifications.

**SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION**

In the event that any party, including an individual member of the DRB, deems it necessary to institute arbitration proceedings to enforce any right or obligation under this AGREEMENT, the parties hereto agree that such action shall be initiated in the Office of Administrative Hearings of the State of California. The parties hereto agree that all questions shall be resolved by arbitration by application of California law and that the parties to such arbitration shall have the right of appeal from such decisions to the Superior Court in conformance with the laws of the State of California. Venue for the arbitration shall be Sacramento or any other location as agreed to by the parties.

**SECTION XIII FEDERAL REVIEW AND REQUIREMENTS**

On Federal-Aid contracts, the Federal Highway Administration shall have the right to review the work of the DRB in progress, except for private meetings or deliberations of the DRB.

Other Federal requirements in this agreement shall only apply to Federal-Aid contracts.

**SECTION XIV CERTIFICATION OF THE CONTRACTOR, THE DRB MEMBERS, AND THE STATE**

IN WITNESS WHEREOF, the parties hereto have executed this AGREEMENT as of the day and year first above written.

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By: _____

Title : _____

DRB MEMBER

By : _____

Title : _____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION

By: _____

Title: _____

**5-1.13 FORCE ACCOUNT PAYMENT**

Payment for extra work at force account will be determined by either non-subcontracted or subcontracted force account payment unless otherwise specified.

**Non-Subcontracted Force Account Payment:**

When extra work to be paid for on a force account basis is performed by the Contractor, compensation will be determined in accordance with Section 9-1.03, "Force Account Payment," of the Standard Specifications and these special provisions.

The second, third and fourth paragraphs of Section 9-1.03A, "Work Performed by Contractor," in the Standard Specifications, shall not apply.

Attention is directed to "Time-Related Overhead" of these special provisions.

To the total of the direct costs for work performed on a force account basis, computed as provided in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications, there will be added the following markups:

| Cost | Percent Markup |
|---|---|
| Labor | 28 |
| Materials | 10 |
| Equipment Rental | 10 |

The above markups shall be applied to work performed on a force account basis, regardless of whether the work revises the current contract completion date.

The above markups, together with payments made for time-related overhead pursuant to "Time-Related Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in conformance with the provisions in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor.

Full compensation for overhead costs for work performed on a force account basis, and for which no adjustment is made to the quantity for time-related overhead conforming to the provisions in "Time-Related Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

**Subcontracted Force Account Payment:**

When extra work to be paid for on a force account basis is performed by a subcontractor approved in conformance with the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, compensation will be determined in accordance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications.

## 5-1.14 AREAS FOR CONTRACTOR'S USE

Attention is directed to the provisions in Section 7-1.19, "Rights in Land and Improvements," of the Standard Specifications and these special provisions.

The highway right of way shall be used only for purposes that are necessary to perform the required work. The Contractor shall not occupy the right of way, or allow others to occupy the right of way, for purposes which are not necessary to perform the required work.

No State-owned parcels adjacent to the right of way are available for the exclusive use of the Contractor within the contract limits. The Contractor shall secure, at the Contractor's own expense, areas required for plant sites, storage of equipment or materials, or for other purposes.

No area is available within the contract limits for the exclusive use of the Contractor. However, temporary storage of equipment and materials on State property may be arranged with the Engineer, subject to the prior demands of State maintenance forces and to other contract requirements. Use of the Contractor's work areas and other State-owned property shall be at the Contractor's own risk, and the State shall not be held liable for damage to or loss of materials or equipment located within such areas.

## 5-1.15 PAYMENTS

Attention is directed to Sections 9-1.06, "Partial Payments," and 9-1.07, "Payment After Acceptance," of the Standard Specifications and these special provisions.

For the purpose of making partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications, the amount set forth for the contract items of work hereinafter listed shall be deemed to be the maximum value of the contract item of work which will be recognized for progress payment purposes:

| | | |
|---|---|---|
| A. | Lead Compliance Plan | $2,000 |
| B. | Prepare Water Pollution Control Program | $3,800 |
| C. | Progress Schedule (Critical Path Method) | $3,800 |

After acceptance of the contract pursuant to the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount, if any, payable for a contract item of work in excess of the maximum value for progress payment purposes hereinabove listed for the item, will be included for payment in the first estimate made after acceptance of the contract.

In determining the partial payments to be made to the Contractor, only the following listed materials will be considered for inclusion in the payment as materials furnished but not incorporated in the work:

A. Metal Beam Guard Railing & Appurtenances
B. Pavement Markers
C. Joint Seal, Type B
D. Fiber Optic Cables
E. Fiber Optic Conduits
F. Innerducts
G. Pavement Dowels

## 5-1.16 PROJECT INFORMATION

The information in this section has been compiled specifically for this project and is made available for bidders and Contractors. Other information referenced in the Standard Specifications and these special provisions do not appear in this section. The information is subject to the conditions and limitations set forth in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," and Section 6-2, "Local Materials," of the Standard Specifications. Bidders and Contractors shall be responsible for knowing the procedures for obtaining information.

Information included in the Information Handout provided to bidders and Contractors is as follows:

A. Portions of "Site Investigation Report, Task Order No. 07-1786A1-QV, Conducted by Ninyo & Moore Geotechnical and Environmental Sciences in January 2003".

Information available for inspection at the District Office is as follows:

A. "Site Investigation Report, Task Order No. 07-1786A1-QV, Conducted by Ninyo & Moore Geotechnical and Environmental Sciences in January 2003".

Cross sections are not available for this project.

The District Office in which the work is situated is located at District 7 Construction Division CCO Unit, 100 South Main St., Room 03-182, Los Angeles, CA 90012, Telephone No. (213) 897-0054.

Plans of the existing bridges may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, CA, Fax (916) 227-8357, and are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, Telephone (213) 897-0877.

Plans of the existing bridges available to bidders and Contractors are reproductions of the original contract plans, with significant changes noted, and working drawings, and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

### 5-1.17 SOUND CONTROL REQUIREMENTS

Sound control shall conform to the provisions in Section 7-1.01I, "Sound Control Requirements," of the Standard Specifications and these special provisions.

The noise level from the Contractor's operations, between the hours of 9:00 p.m. and 7:00 a.m., shall not exceed 86 dBa at a distance of 15 m. This requirement shall not relieve the Contractor from responsibility for complying with local ordinances regulating noise level.

The noise level requirement shall apply to the equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment that may or may not be owned by the Contractor. The use of loud sound signals shall be avoided in favor of light warnings except those required by safety laws for the protection of personnel.

Full compensation for conforming to the requirements of this section shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

### 5-1.18 INTERNET DAILY EXTRA WORK REPORT

When extra work is being paid for on a force account basis, the Contractor shall submit daily extra work reports in conformance with the provisions in Section 9-1.03C, "Records," of the Standard Specifications and these special provisions.

The Contractor shall send daily extra work reports to the Engineer using the Department's Internet extra work billing system. The reports shall conform to the requirements in the "iCAS User's Guide" (Guide). The Guide is available from the Department, and is also found on the Internet at:

http://www.dot.ca.gov/hq/construc/ewb/EWB_INSTRUCTION.pdf

The Department will provide system accounts to the Contractor's authorized representatives when at least one of the representatives has received training. The Department will provide system training to at least one of the Contractor's authorized representatives within 30 days of the Contractor's request for training. The Department will assign an account and user identification to the Contractor's authorized representatives, and each Contractor's authorized representative shall maintain a unique password. A daily extra work report that the Contractor's authorized representative sends to the Department using the Internet extra work billing system will be considered signed by the Contractor. A daily extra work report that the Engineer approves using the Internet extra work billing system will be considered signed by the Engineer.

Daily extra work reports that include billing for materials shall be substantiated by a valid copy of a vendor's invoice in conformance to the requirements in Section 9-1.03C, "Records," of the Standard Specifications. Each materials invoice shall clearly identify the relative daily extra work report and the associated cost of the materials. In addition to postal service and parcel service and if approved by the Engineer, invoices may be sent by facsimile or as an electronic-mail attachment.

The Contractor shall maintain the Contractor's interface with the Department's Internet extra work billing system. If the Contractor is using the file transfer process to submit extra work reports, it shall conform to the file transfer format and process defined in the Guide.

## SECTION 6. (BLANK)

## SECTION 7. (BLANK)

## SECTION 8. MATERIALS

## SECTION 8-1. MISCELLANEOUS

### 8-1.01 SUBSTITUTION OF NON-METRIC MATERIALS AND PRODUCTS

Only materials and products conforming to the requirements of the specifications shall be incorporated in the work. When metric materials and products are not available, and when approved by the Engineer, and at no cost to the State, materials and products in the United States Standard Measures which are of equal quality and of the required properties and characteristics for the purpose intended, may be substituted for the equivalent metric materials and products, subject to the following provisions:

A. Materials and products shown on the plans or in the special provisions as being equivalent may be substituted for the metric materials and products specified or detailed on the plans.
B. Before other non-metric materials and products will be considered for use, the Contractor shall furnish, at the Contractor's expense, evidence satisfactory to the Engineer that the materials and products proposed for use are equal to or better than the materials and products specified or detailed on the plans. The burden of proof as to the quality and suitability of substitutions shall be upon the Contractor and the Contractor shall furnish necessary information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of the substituted materials and products and the Engineer's decision will be final.
C. When the Contractor elects to substitute non-metric materials and products, including materials and products shown on the plans or in the special provisions as being equivalent, the list of sources of material specified in Section 6-1.01, "Source of Supply and Quality of Materials," of the Standard Specification shall include a list of substitutions to be made and contract items involved. In addition, for a change in design or details, the Contractor shall submit plans and working drawings in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The plans and working drawings shall be submitted at least 7 days before the Contractor intends to begin the work involved.

Unless otherwise specified, the following substitutions of materials and products will be allowed:

SUBSTITUTION TABLE FOR PLAIN WIRE REINFORCEMENT
ASTM Designation: A 82

| METRIC SIZE SHOWN ON THE PLANS $mm^2$ | SIZE TO BE SUBSTITUTED $inch^2$ x 100 |
|---|---|
| MW9 | W1.4 |
| MW10 | W1.6 |
| MW13 | W2.0 |
| MW15 | W2.3 |
| MW19 | W2.9 |
| MW20 | W3.1 |
| MW22 | W3.5 |
| MW25 | W3.9, except W3.5 in piles only |
| MW26 | W4.0 |
| MW30 | W4.7 |
| MW32 | W5.0 |
| MW35 | W5.4 |
| MW40 | W6.2 |
| MW45 | W6.5 |
| MW50 | W7.8 |
| MW55 | W8.5, except W8.0 in piles only |
| MW60 | W9.3 |
| MW70 | W10.9, except W11.0 in piles only |
| MW80 | W12.4 |
| MW90 | W14.0 |
| MW100 | W15.5 |

SUBSTITUTION TABLE FOR BAR REINFORCEMENT

| METRIC BAR DESIGNATION NUMBER[1] SHOWN ON THE PLANS | BAR DESIGNATION NUMBER[2] TO BE SUBSTITUTED |
|---|---|
| 10 | 3 |
| 13 | 4 |
| 16 | 5 |
| 19 | 6 |
| 22 | 7 |
| 25 | 8 |
| 29 | 9 |
| 32 | 10 |
| 36 | 11 |
| 43 | 14 |
| 57 | 18 |

[1]Bar designation numbers approximate the number of millimeters of the nominal diameter of the bars.
[2]Bar numbers are based on the number of eighths of an inch included in the nominal diameter of the bars.
No adjustment will be required in spacing or total number of reinforcing bars due to a difference in minimum yield strength between metric and non-metric bars.

SUBSTITUTION TABLE FOR SIZES OF:

(1) STEEL FASTENERS FOR GENERAL APPLICATIONS (ASTM Designation: A 307 or AASHTO Designation: M 314, Grade 36 or 55), and

(2) HIGH STRENGTH STEEL FASTENERS (ASTM Designation: A 325 or A 449)

| METRIC SIZE SHOWN ON THE PLANS<br>mm | SIZE TO BE SUBSTITUTED<br>inch |
|---|---|
| 6 or 6.35 | 1/4 |
| 8 or 7.94 | 5/16 |
| 10 or 9.52 | 3/8 |
| 11 or 11.11 | 7/16 |
| 13, 12.70, or M12 | 1/2 |
| 14 or 14.29 | 9/16 |
| 16, 15.88, or M16 | 5/8 |
| 19, 19.05, or M20 | 3/4 |
| 22, 22.22, or M22 | 7/8 |
| 24, 25, 25.40, or M24 | 1 |
| 29, 28.58, or M27 | 1-1/8 |
| 32, 31.75, or M30 | 1-1/4 |
| 35 or 34.93 | 1-3/8 |
| 38, 38.10, or M36 | 1-1/2 |
| 44 or 44.45 | 1-3/4 |
| 51 or 50.80 | 2 |
| 57 or 57.15 | 2-1/4 |
| 64 or 63.50 | 2-1/2 |
| 70 or 69.85 | 2-3/4 |
| 76 or 76.20 | 3 |
| 83 or 82.55 | 3-1/4 |
| 89 or 88.90 | 3-1/2 |
| 95 or 95.25 | 3-3/4 |
| 102 or 101.60 | 4 |

SUBSTITUTION TABLE FOR NOMINAL THICKNESS OF SHEET METAL

| UNCOATED HOT AND COLD ROLLED SHEETS | | HOT-DIPPED ZINC COATED SHEETS (GALVANIZED) | |
|---|---|---|---|
| METRIC THICKNESS SHOWN ON THE PLANS mm | GAGE TO BE SUBSTITUTED inch | METRIC THICKNESS SHOWN ON THE PLANS mm | GAGE TO BE SUBSTITUTED inch |
| 7.94 | 0.3125 | 4.270 | 0.1681 |
| 6.07 | 0.2391 | 3.891 | 0.1532 |
| 5.69 | 0.2242 | 3.510 | 0.1382 |
| 5.31 | 0.2092 | 3.132 | 0.1233 |
| 4.94 | 0.1943 | 2.753 | 0.1084 |
| 4.55 | 0.1793 | 2.372 | 0.0934 |
| 4.18 | 0.1644 | 1.994 | 0.0785 |
| 3.80 | 0.1495 | 1.803 | 0.0710 |
| 3.42 | 0.1345 | 1.613 | 0.0635 |
| 3.04 | 0.1196 | 1.461 | 0.0575 |
| 2.66 | 0.1046 | 1.311 | 0.0516 |
| 2.28 | 0.0897 | 1.158 | 0.0456 |
| 1.90 | 0.0747 | 1.006 or 1.016 | 0.0396 |
| 1.71 | 0.0673 | 0.930 | 0.0366 |
| 1.52 | 0.0598 | 0.853 | 0.0336 |
| 1.37 | 0.0538 | 0.777 | 0.0306 |
| 1.21 | 0.0478 | 0.701 | 0.0276 |
| 1.06 | 0.0418 | 0.627 | 0.0247 |
| 0.91 | 0.0359 | 0.551 | 0.0217 |
| 0.84 | 0.0329 | 0.513 | 0.0202 |
| 0.76 | 0.0299 | 0.475 | 0.0187 |
| 0.68 | 0.0269 | -------- | -------- |
| 0.61 | 0.0239 | -------- | -------- |
| 0.53 | 0.0209 | -------- | -------- |
| 0.45 | 0.0179 | -------- | -------- |
| 0.42 | 0.0164 | -------- | -------- |
| 0.38 | 0.0149 | -------- | -------- |

SUBSTITUTION TABLE FOR WIRE

| METRIC THICKNESS SHOWN ON THE PLANS mm | WIRE THICKNESS TO BE SUBSTITUTED inch | GAGE NO. |
|---|---|---|
| 6.20 | 0.244 | 3 |
| 5.72 | 0.225 | 4 |
| 5.26 | 0.207 | 5 |
| 4.88 | 0.192 | 6 |
| 4.50 | 0.177 | 7 |
| 4.11 | 0.162 | 8 |
| 3.76 | 0.148 | 9 |
| 3.43 | 0.135 | 10 |
| 3.05 | 0.120 | 11 |
| 2.69 | 0.106 | 12 |
| 2.34 | 0.092 | 13 |
| 2.03 | 0.080 | 14 |
| 1.83 | 0.072 | 15 |
| 1.57 | 0.062 | 16 |
| 1.37 | 0.054 | 17 |
| 1.22 | 0.048 | 18 |
| 1.04 | 0.041 | 19 |
| 0.89 | 0.035 | 20 |

SUBSTITUTION TABLE FOR PIPE PILES

| METRIC SIZE SHOWN ON THE PLANS mm x mm | SIZE TO BE SUBSTITUTED inch x inch |
|---|---|
| PP 360 x 4.55 | NPS 14 x 0.179 |
| PP 360 x 6.35 | NPS 14 x 0.250 |
| PP 360 x 9.53 | NPS 14 x 0.375 |
| PP 360 x 11.12 | NPS 14 x 0.438 |
| PP 406 x 12.70 | NPS 16 x 0.500 |
| PP 460 x T | NPS 18 x T" |
| PP 508 x T | NPS 20 x T" |
| PP 559 x T | NPS 22 x T" |
| PP 610 x T | NPS 24 x T" |
| PP 660 x T | NPS 26 x T" |
| PP 711 x T | NPS 28 x T" |
| PP 762 x T | NPS 30 x T" |
| PP 813 x T | NPS 32 x T" |
| PP 864 x T | NPS 34 x T" |
| PP 914 x T | NPS 36 x T" |
| PP 965 x T | NPS 38 x T" |
| PP 1016 x T | NPS 40 x T" |
| PP 1067 x T | NPS 42 x T" |
| PP 1118 x T | NPS 44 x T" |
| PP 1219 x T | NPS 48 x T" |
| PP 1524 x T | NPS 60 x T" |

The thickness in millimeters (T) represents an exact conversion of the thickness in inches (T").

SUBSTITUTION TABLE FOR CIDH CONCRETE PILING

| METRIC SIZE SHOWN ON THE PLANS | ACTUAL AUGER SIZE TO BE SUBSTITUTED inches |
|---|---|
| 350 mm | 14 |
| 400 mm | 16 |
| 450 mm | 18 |
| 600 mm | 24 |
| 750 mm | 30 |
| 900 mm | 36 |
| 1.0 m | 42 |
| 1.2 m | 48 |
| 1.5 m | 60 |
| 1.8 m | 72 |
| 2.1 m | 84 |
| 2.4 m | 96 |
| 2.7 m | 108 |
| 3.0 m | 120 |
| 3.3 m | 132 |
| 3.6 m | 144 |
| 4.0 m | 156 |
| | |
| | |
| | |
| | |

SUBSTITUTION TABLE FOR STRUCTURAL TIMBER AND LUMBER

| METRIC MINIMUM DRESSED DRY, SHOWN ON THE PLANS mm x mm | METRIC MINIMUM DRESSED GREEN, SHOWN ON THE PLANS mm x mm | NOMINAL SIZE TO BE SUBSTITUTED inch x inch |
|---|---|---|
| 19x89 | 20x90 | 1x4 |
| 38x89 | 40x90 | 2x4 |
| 64x89 | 65x90 | 3x4 |
| 89x89 | 90x90 | 4x4 |
| 140x140 | 143x143 | 6x6 |
| 140x184 | 143x190 | 6x8 |
| 184x184 | 190x190 | 8x8 |
| 235x235 | 241x241 | 10x10 |
| 286x286 | 292x292 | 12x12 |

SUBSTITUTION TABLE FOR NAILS AND SPIKES

| METRIC COMMON NAIL, SHOWN ON THE PLANS<br><br>Length, mm<br>Diameter, mm | METRIC BOX NAIL, SHOWN ON THE PLANS<br><br>Length, mm<br>Diameter, mm | METRIC SPIKE, SHOWN ON THE PLANS<br>Length, mm<br>Diameter, mm | SIZE TO BE SUBSTITUTED<br>Penny-weight |
|---|---|---|---|
| 50.80<br>2.87 | 50.80<br>2.51 | _____ | 6d |
| 63.50<br>3.33 | 63.50<br>2.87 | _____ | 8d |
| 76.20<br>3.76 | 76.20<br>3.25 | 76.20<br>4.88 | 10d |
| 82.55<br>3.76 | 82.55<br>3.25 | 82.55<br>4.88 | 12d |
| 88.90<br>4.11 | 88.90<br>3.43 | 88.90<br>5.26 | 16d |
| 101.60<br>4.88 | 101.60<br>3.76 | 101.60<br>5.72 | 20d |
| 114.30<br>5.26 | 114.30<br>3.76 | 114.30<br>6.20 | 30d |
| 127.00<br>5.72 | 127.00<br>4.11 | 127.00<br>6.68 | 40d |
| _____ | _____ | 139.70<br>7.19 | 50d |
| _____ | _____ | 152.40<br>7.19 | 60d |

SUBSTITUTION TABLE FOR IRRIGATION COMPONENTS

| METRIC WATER METERS, TRUCK LOADING STANDPIPES, VALVES, BACKFLOW PREVENTERS, FLOW SENSORS, WYE STRAINERS, FILTER ASSEMBLY UNITS, PIPE SUPPLY LINES, AND PIPE IRRIGATION SUPPLY LINES SHOWN ON THE PLANS DIAMETER NOMINAL (DN) mm | NOMINAL SIZE TO BE SUBSTITUTED inch |
|---|---|
| 15 | 1/2 |
| 20 | 3/4 |
| 25 | 1 |
| 32 | 1-1/4 |
| 40 | 1-1/2 |
| 50 | 2 |
| 65 | 2-1/2 |
| 75 | 3 |
| 100 | 4 |
| 150 | 6 |
| 200 | 8 |
| 250 | 10 |
| 300 | 12 |
| 350 | 14 |
| 400 | 16 |

Unless otherwise specified, substitutions of United States Standard Measures standard structural shapes corresponding to the metric designations shown on the plans and in conformance with the requirements in ASTM Designation: A 6/A 6M, Annex 2, will be allowed.

**8-1.02 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS**

The Department maintains the following list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included on the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included on the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

Materials and products may be added to the list of Prequalified and Tested Signing and Delineation Materials if the manufacturer submits a New Product Information Form to the New Product Coordinator at the Transportation Laboratory. Upon a Departmental request for samples, sufficient samples shall be submitted to permit performance of required tests. Approval of materials or products will depend upon compliance with the specifications and tests the Department may elect to perform.

**PAVEMENT MARKERS, PERMANENT TYPE**

**Retroreflective With Abrasion Resistant Surface (ARS)**

A. Apex, Model 921AR (100 mm x 100 mm)
B. Avery Dennison, Models C88 (100 mm x 100 mm), 911 (100 mm x 100 mm) and 953 (70 mm x 114 mm)
C. Ray-O-Lite, Model "AA" ARS (100 mm x 100 mm)
D. 3M Series 290 (89 mm x 100 mm)
E. 3M Series 290 PSA, with pressure sensitive adhesive pad (89 mm x 100 mm)

**Retroreflective With Abrasion Resistant Surface (ARS)**

(for recessed applications only)

A. Avery Dennison, Model 948 (58 mm x 119 mm)
B. Avery Dennison, Model 944SB (51 mm x 100 mm)*
C. Ray-O-Lite, Model 2002 (58 mm x 117 mm)
D. Ray-O-Lite, Model 2004 ARS (51 mm x 100 mm)*

*For use only in 114 mm wide (older) recessed slots

**Non-Reflective, 100 mm Round**

A. Apex Universal (Ceramic)
B. Apex Universal, Models 929 (ABS) and 929PP (Polypropylene)
C. Glowlite, Inc., (Ceramic)
D. Hi-Way Safety, Inc., Models P20-2000W and 2001Y (ABS)
E. Interstate Sales, "Diamond Back" (ABS) and (Polypropylene)
F. Novabrite Models Cdot (White) Cdot-y (Yellow), Ceramic
G. Novabrite Models Pdot-w (White) Pdot-y (Yellow), Polypropylene
H. Road Creations, Model RCB4NR (Acrylic)
I. Three D Traffic Works TD10000 (ABS), TD10500 (Polypropylene)

**PAVEMENT MARKERS, TEMPORARY TYPE**

**Temporary Markers For Long Term Day/Night Use (6 months or less)**

A. Vega Molded Products "Temporary Road Marker" (75 mm x 100 mm)

**Temporary Markers For Short Term Day/Night Use (14 days or less)**

(For seal coat or chip seal applications, clear protective covers are required)

A. Apex Universal, Model 932
B. Bunzl Extrusion, Models T.O.M., T.R.P.M., and "HH" (High Heat)
C. Hi-Way Safety, Inc., Model 1280/1281
D. Glowlite, Inc., Model 932

**STRIPING AND PAVEMENT MARKING MATERIAL**

**Permanent Traffic Striping and Pavement Marking Tape**

A. Advanced Traffic Marking, Series 300 and 400
B. Brite-Line, Series 1000
C. Brite-Line, "DeltaLine XRP"
D. Swarco Industries, "Director 35" (For transverse application only)
E. Swarco Industries, "Director 60"
F. 3M, "Stamark" Series 380 and 5730
G. 3M, "Stamark" Series 420 (For transverse application only)

**Temporary (Removable) Striping and Pavement Marking Tape (6 months or less)**

A. Advanced Traffic Marking, Series 200
B. Brite-Line, Series 100
C. Garlock Rubber Technologies, Series 2000
D. P.B. Laminations, Aztec, Grade 102
E. Swarco Industries, "Director-2"
F. Trelleborg Industri, R140 Series
G. 3M, Series 620 "CR", and Series A750

H. 3M, Series A145, Removable Black Line Mask
(Black Tape: for use only on Asphalt Concrete Surfaces)
I. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: for use only on Asphalt Concrete Surfaces)
J. Brite-Line "BTR" Black Removable Tape
(Black Tape: for use only on Asphalt Concrete Surfaces)
K. Trelleborg Industri, RB-140
(Black Tape: for use only on Asphalt Concrete Surfaces)

**Preformed Thermoplastic (Heated in place)**

A. Avery Dennison, "Hotape"
B. Flint Trading, "Premark," "Premark 20/20 Flex," and "Premark 20/20 Flex Plus"

**Ceramic Surfacing Laminate, 150 mm x 150 mm**

A. Highway Ceramics, Inc.

**CLASS 1 DELINEATORS**

**One Piece Driveable Flexible Type, 1700 mm**

A. Bunzl Extrusion, "Flexi-Guide Models 400 and 566"
B. Carsonite, Curve-Flex CFRM-400
C. Carsonite, Roadmarker CRM-375
D. FlexStake, Model 654 TM
E. GreenLine Models HWD1-66 and CGD1-66

**Special Use Type, 1700 mm**

A. Bunzl Extrusion, Model FG 560 (with 450 mm U-Channel base)
B. Carsonite, "Survivor" (with 450 mm U-Channel base)
C. Carsonite, Roadmarker CRM-375 (with 450 mm U-Channel base)
D. FlexStake, Model 604
E. GreenLine Models HWDU and CGD (with 450 mm U-Channel base)
F. Impact Recovery Model D36, with #105 Driveable Base
G. Safe-Hit with 200 mm pavement anchor (SH248-GP1)
H. Safe-Hit with 380 mm soil anchor (SH248-GP2) and with 450 mm soil anchor (SH248-GP3)

**Surface Mount Type, 1200 mm**

A. Bent Manufacturing Company, Masterflex Model MF-180EX-48
B. Carsonite, "Super Duck II"
C. FlexStake, Surface Mount, Models 704 and 754 TM
D. Impact Recovery Model D48, with #101 Fixed (Surface-Mount) Base
E. Three D Traffic Works "Channelflex" ID No. 522248W

**CHANNELIZERS**

**Surface Mount Type, 900 mm**

A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
B. Bunzl Extrusion, Flexi-Guide Models FG300PE and FG300UR
C. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
D. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
E. FlexStake, Surface Mount, Models 703 and 753 TM
F. GreenLine, Model SMD-36
G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
H. Impact Recovery Model D36, with #101 Fixed (Surface-Mount) Base
I. Repo, Models 300 and 400
J. Safe-Hit, Guide Post, Model SH236SMA
K. Three D Traffic Works "Channelflex" ID No. 522053W

**Lane Separation System**

A. Bunzl "Flexi-Guide (FG) 300 Curb System"

B. Qwick Kurb, "Klemmfix Guide System"
C. Recycled Technology, Inc. "Safe-Lane System"

**CONICAL DELINEATORS, 1070 mm**
(For 700 mm Traffic Cones, see Standard Specifications)
A. Bent Manufacturing Company "T-Top"
B. Plastic Safety Systems "Navigator-42"
C. Radiator Specialty Company "Enforcer"
D. Roadmaker Company "Stacker"
E. TrafFix Devices "Grabber"
F. Three D Traffic Works "Ringtop" TD7000, ID No. 742143

**OBJECT MARKERS**
**Type "K", 450 mm**
A. Bunzl, Model FG318PE
B. Carsonite, Model SMD 615
C. FlexStake, Model 701 KM
D. Repo, Models 300 and 400
E. Safe-Hit, Model SH718SMA

**Type "K-4" / "Q" Object Markers, 600 mm**
A. Bent Manufacturing "Masterflex" Model MF-360-24
B. Bunzl Extrusion, Model FG324PE
C. Carsonite, Super Duck II
D. FlexStake, Model 701KM
E. Repo, Models 300 and 400
F. Safe-Hit, Models SH8 24SMA_WA and SH8 24GP3_WA
G. The Line Connection, Model DP21-4Q
H. Three D Traffic Works "Q" Marker, ID No. 531702W

**CONCRETE BARRIER MARKERS AND**
**TEMPORARY RAILING (TYPE K) REFLECTORS**
**Impactable Type**
A. ARTUK, "FB"
B. Bunzl Extrusion, Models PCBM-12 and PCBM-T12
C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
D. Hi-Way Safety, Inc., Model GMKRM100
E. Plastic Safety Systems "BAM" Models OM-BARR and OM-BWAR
F. Sun-Lab Technology, "Safety Guide Light Model TM-5"
G. Three D Traffic Works "Roadguide" 9304 Series, ID No. 903176 (One-Way), ID No. 903215 (Two-Way)

**Non-Impactable Type**
A. ARTUK, JD Series
B. Plastic Safety Systems "BAM" Models OM-BITARW and OM-BITARA
C. Vega Molded Products, Models GBM and JD

**METAL BEAM GUARD RAIL POST MARKERS**
(For use to the left of traffic)
A. Bunzl Extrusion, "Mini" (75 mm x 254 mm)
B. Creative Building Products, "Dura-Bull, Model 11201"
C. Duraflex Corp., "Railrider"

**CONCRETE BARRIER DELINEATORS, 400 mm**
(For use to the right of traffic)
A. Bunzl Extrusion, Model PCBM T-16
B. Safe-Hit, Model SH216RBM
C. Sun-Lab Technology, "Safety Guide Light, Model TM16," (75 mm x 300 mm)
D. Three D Traffic Works "Roadguide" ID No. 904364 (White), ID No. 904390 (Yellow)

**CONCRETE BARRIER-MOUNTED MINI-DRUM (260 mm x 360 mm x 570 mm)**

A. Stinson Equipment Company "SaddleMarker"

**SOUND WALL DELINEATOR**

(Applied vertically. Place top of 75 mm x 300 mm reflective element at 1200 mm above roadway)

A. Bunzl Extrusion, PCBM S-36
B. Sun-Lab Technology, "Safety Guide Light, Model SM12," (75 mm x 300 mm)

**GUARD RAILING DELINEATOR**

(Place top of reflective element at 1200 mm above plane of roadway)

**Wood Post Type, 686 mm**

A. Bunzl Extrusion, FG 427 and FG 527
B. Carsonite, Model 427
C. FlexStake, Model 102 GR
D. GreenLine GRD 27
E. Safe-Hit, Model SH227GRD
F. Three D Traffic Works "Guardflex" TD9100 Series, ID No. 510476

**Steel Post Type**

A. Carsonite, Model CFGR-327 with CFGRBK300 Mounting Bracket

**RETROREFLECTIVE SHEETING**

**Channelizers, Barrier Markers, and Delineators**

A. Avery Dennison T-6500 Series (For rigid substrate devices only)
B. Avery Dennison WR-6100 Series
C. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
D. Reflexite, PC-1000 Metalized Polycarbonate
E. Reflexite, AC-1000 Acrylic
F. Reflexite, AP-1000 Metalized Polyester
G. Reflexite, Conformalight, AR-1000 Abrasion Resistant Coating
H. 3M, High Intensity

**Traffic Cones, 330 mm Sleeves**

A. Reflexite SB (Polyester), Vinyl or "TR" (Semi-transparent)

**Traffic Cones, 100 mm and 150 mm Sleeves**

A. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
B. Reflexite, Vinyl, "TR" (Semi-transparent) or "Conformalight"
C. 3M Series 3840

**Barrels and Drums**

A. Avery Dennison WR-6100
B. Nippon Carbide Industries, Flexible Ultralite Grade (ULG) II
C. Reflexite, "Conformalight", "Super High Intensity" or "High Impact Drum Sheeting"
D. 3M Series 3810

**Barricades: Type I, Medium-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

A. American Decal, Adcolite
B. Avery Dennison, T-1500 and T-1600 series
C. 3M Engineer Grade, Series 3170

**Barricades: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

A. Avery Dennison, T-2500 Series
B. Kiwalite Type II
C. Nikkalite 1800 Series

**Signs: Type II, Medium-High-Intensity (Typically Enclosed Lens, Glass-Bead Element)**

A. Avery Dennison, T-2500 Series
B. Kiwalite, Type II
C. Nikkalite 1800 Series

**Signs: Type III, High-Intensity (Typically Encapsulated Glass-Bead Element)**

A. Avery Dennison, T-5500 and T-5500A Series
B. Nippon Carbide Industries, Nikkalite Brand Ultralite Grade II
C. 3M Series 3870

**Signs: Type IV, High-Intensity (Typically Unmetallized Microprismatic Element)**

A. Avery Dennison, T-6500 Series
B. Nippon Carbide Industries, Crystal Grade, 94000 Series
C. Nippon Carbide Industries, Model No. 94847 Fluorescent Orange
D. Nippon Carbide Industries, Model No. 94844 Fluorescent Yellow Green

**Signs: Type VI, Elastomeric (Roll-Up) High-Intensity, without Adhesive**

A. Avery Dennison, WU-6014
B. Novabrite LLC, "Econobrite"
C. Reflexite "Vinyl"
D. Reflexite "SuperBright"
E. Reflexite "Marathon"
F. 3M Series RS34 Orange and RS20 Fluorescent Orange

**Signs: Type VII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

A. 3M LDP Series 3924 Fluorescent Orange
B. 3M LDP Series 3970

**Signs: Type VIII, Super-High-Intensity (Typically Unmetallized Microprismatic Element)**

A. Avery Dennison, T-7500 Series
B. Avery Dennison, T-7511 Fluorescent Yellow
C. Avery Dennison, T-7513 Fluorescent Yellow Green
D. Avery Dennison, W-7514 Fluorescent Orange
E. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92802 White
F. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92844 Fluorescent Yellow/Green
G. Nippon Carbide Industries, Nikkalite Crystal Grade Model 92847 Fluorescent Orange

**Signs: Type IX, Very-High-Intensity (Typically Unmetallized Microprismatic Element)**

A. 3M VIP Series 3981 Diamond Grade Fluorescent Yellow
B. 3M VIP Series 3983 Diamond Grade Fluorescent Yellow/Green
C. 3M VIP Series 3990 Diamond Grade

**SPECIALTY SIGNS**

A. Hallmark Technologies, Inc., All Sign STOP Sign (All Plastic), 750 mm
B. Reflexite "Endurance" Work Zone Sign (with Semi-Rigid Plastic Substrate)

**SIGN SUBSTRATE**

**Fiberglass Reinforced Plastic (FRP)**

A. Fiber-Brite
B. Sequentia, "Polyplate"
C. Inteplast Group "InteCel" (13 mm for Post-Mounted CZ Signs, 1200 mm or less)

**Aluminum Composite**

A. Alcan Composites "Dibond Material, 2 mm" (for temporary construction signs only)
B. Mitsubishi Chemical America, Alpolic 350 (for temporary construction signs only)

**8-1.03 SLAG AGGREGATE**

Air-cooled iron blast furnace slag shall not be used to produce aggregate for:

A. Reinforced or prestressed portland cement concrete component or structure.

Aggregate produced from slag resulting from a steel-making process shall not be used for a highway construction project except for the following item:

A. Asphalt Concrete.

A supplier of steel slag aggregate shall provide separate stockpiles for controlled aging of the slag. An individual stockpile shall contain not less than 9075 tonnes nor more than 45 350 tonnes of slag. The material in each individual stockpile shall be assigned a unique lot number and each stockpile shall be identified with a permanent system of signs. The supplier shall maintain a permanent record of the dates on which stockpiles are completed and controlled aging begun, of the dates when controlled aging was completed, and of the dates tests were made and the results of these tests. Moisture tests shall be made at least once each week. No credit for aging will be given for the time period covered by tests which show a moisture content of 6 percent or less. The stockpiles and records shall be available to the Engineer during normal working hours for inspection, check testing and review.

The supplier shall notify the Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819, when each stockpile is completed and controlled aging begun. No more aggregate shall be added to the stockpile unless a new aging period is initiated. A further notification shall be sent when controlled aging is completed.

The supplier shall provide a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. Each stockpile or portion of a stockpile that is used in the work will be considered a lot. The Certificates of Compliance shall state that the steel slag aggregate has been aged in a stockpile for at least 3 months at a moisture content in excess of 6 percent of the dry mass of the aggregate.

Air-cooled iron blast furnace slag or natural aggregate may be blended in proper combinations with steel slag aggregate to produce the specified gradings, for those items for which steel slag aggregate is permitted, unless otherwise provided.

Aggregate containing slag shall meet the applicable quality requirements for the items in which the aggregate is used.

The combined slag aggregate shall conform to the specified grading for the item in which it is used. The grading will be determined by California Test 202, modified by California Test 105 when there is a difference in specific gravity of 0.2 or more between the coarse and fine portion of the aggregate or between blends of different aggregates.

No aggregate produced from slag shall be placed within 0.3-m, measured in any direction, of a non-cathodically protected pipe or structure unless the aggregate is incorporated in portland cement concrete pavement, in asphalt concrete, or in treated base.

When slag is used as aggregate in asphalt concrete, the $K_c$ factor requirements, as determined by California Test 303, will not apply.

Slag aggregate used for embankment construction shall not be placed within 0.46-m of finished slope lines, measured normal to the plane of the slope.

If steel slag aggregates are used to make asphalt concrete, there shall be no other aggregates used in the mixture, except that up to 50 percent of the material passing the 4.75-mm sieve may consist of iron blast furnace slag aggregates or natural aggregates, or a combination thereof. If iron blast furnace aggregates or natural aggregates or a combination thereof are used in the mix, each type of aggregate shall be fed to the drier at a uniform rate. The rate of feed of each type of aggregate shall be maintained within 10 percent of the amount set. Adequate means shall be provided for controlling and checking the accuracy of the feeder.

In addition to the requirements of Section 39-3.01, "Storage," of the Standard Specifications, steel slag aggregate shall be stored separately from iron blast furnace slag aggregate and each type of slag aggregate shall also be stored separately from natural aggregate.

Asphalt concrete produced from more than one of the following shall not be placed in the same layer: steel slag aggregates, iron blast furnace slag aggregates, natural aggregates or any combination thereof. Once a type of aggregate or aggregates is selected, it shall not be changed without prior approval by the Engineer.

If steel slag aggregates are used to produce asphalt concrete, and if the specific gravity of a compacted stabilometer test specimen is in excess of 2.40, the quantity of asphalt concrete to be paid for will be reduced. The stabilometer test specimen will be fabricated in conformance with the procedures in California Test 304 and the specific gravity of the specimen will be determined in conformance with Method C of California Test 308. The pay quantity of asphalt concrete will be determined by multiplying the quantity of asphalt concrete placed in the work by 2.40 and dividing the result by the specific gravity of the compacted stabilometer test specimen. Such reduction in quantity will be determined and applied as often as is necessary to ensure accurate results as determined by the Engineer.

## SECTION 8-2. CONCRETE

### 8-2.01 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

References to Section 90-2.01, "Portland Cement," of the Standard Specifications shall mean Section 90-2.01, "Cement," of the Standard Specifications.

Mineral admixture shall be combined with cement in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications for the concrete materials specified in Section 56-2, "Roadside Signs," of the Standard Specifications.

The requirements of Section 90-4.08, "Required Use of Mineral Admixture," of the Standard Specifications shall not apply to Section 19-3.025C, "Soil Cement Bedding," of the Standard Specifications.

The Department maintains a list of sources of fine and coarse aggregate that have been approved for use with a reduced amount of mineral admixture in the total amount of cementitious material to be used. A source of aggregate will be considered for addition to the approved list if the producer of the aggregate submits to the Transportation Laboratory certified test results from a qualified testing laboratory that verify the aggregate complies with the requirements. Prior to starting the testing, the aggregate test shall be registered with the Department. A registration number can be obtained by calling (916) 227-7228. The registration number shall be used as the identification for the aggregate sample in correspondence with the Department. Upon request, a split of the tested sample shall be provided to the Department. Approval of aggregate will depend upon compliance with the specifications, based on the certified test results submitted, together with any replicate testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

A. Laboratories performing ASTM Designation: C 1293 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Concrete Proficiency Sample Program and shall have received a score of 3 or better on all tests of the previous 2 sets of concrete samples.
B. Laboratories performing ASTM Designation: C 1260 shall participate in the Cement and Concrete Reference Laboratory (CCRL) Pozzolan Proficiency Sample Program and shall have received a score of 3 or better on the shrinkage and soundness tests of the previous 2 sets of pozzolan samples.

Aggregates on the list shall conform to one of the following requirements:

A. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1293, the average expansion at one year shall be less than or equal to 0.040 percent; or
B. When the aggregate is tested in conformance with the requirements in California Test 554 and ASTM Designation: C 1260, the average of the expansion at 16 days shall be less than or equal to 0.15 percent.

The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications and shall conform to the following:

A. The minimum amount of cement shall not be less than 75 percent by mass of the specified minimum cementitious material content.
B. The minimum amount of mineral admixture to be combined with cement shall be determined using one of the following criteria:

    1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by mass, the amount of mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.
    2. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass, and any of the aggregates used are not listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 25 percent by mass of the total amount of cementitious material to be used in the mix.
    3. When the calcium oxide content of a mineral admixture is greater than 2 percent by mass and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of

mineral admixture shall not be less than 15 percent by mass of the total amount of cementitious material to be used in the mix.

4. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used, the amount of mineral admixture shall not be less than 10 percent by mass of the total amount of cementitious material to be used in the mix.
5. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," of the Standard Specifications is used and the fine and coarse aggregates are listed on the approved list as specified in these special provisions, then the amount of mineral admixture shall not be less than 7 percent by mass of the total amount of cementitious material to be used in the mix.

C. The total amount of mineral admixture shall not exceed 35 percent by mass of the total amount of cementitious material to be used in the mix. Where Section 90-1.01, "Description," of the Standard Specifications specifies a maximum cementitious content in kilograms per cubic meter, the total mass of cement and mineral admixture per cubic meter shall not exceed the specified maximum cementitious material content.

## SECTION 8-3. WELDING

### 8-3.01 WELDING

**GENERAL**

Flux core welding electrodes conforming to the requirements of AWS A5.20 E6XT-4 or E7XT-4 shall not be used to perform welding for this project.

Wherever reference is made to the following AWS welding codes in the Standard Specifications, on the plans, or in these special provisions, the year of adoption for these codes shall be as listed:

| AWS Code | Year of Adoption |
|---|---|
| D1.1 | 2002 |
| D1.4 | 1998 |
| D1.5 | 2002 |
| D1.6 | 1999 |

Requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans, or in these special provisions. Wherever the abbreviation AWS is used, it shall be equivalent to the abbreviations ANSI/AWS or AASHTO/AWS.

Section 6.1.1.1 of AWS D1.5 is replaced with the following:

Quality Control (QC) shall be the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing of each weld joint prior to welding, during welding, and after welding as specified in this section and as necessary to ensure that materials and workmanship conform to the requirements of the contract documents.

Sections 6.1.3 through 6.1.4.3 of AWS D1.1, Section 7.1.2 of AWS D1.4, and Sections 6.1.1.2 through 6.1.3.3 of AWS D1.5 are replaced with the following:

The QC Inspector shall be the duly designated person who acts for and on behalf of the Contractor for inspection, testing, and quality related matters for all welding.

Quality Assurance (QA) is the prerogative of the Engineer. The QA Inspector is the duly designated person who acts for and on behalf of the Engineer.

The QC Inspector shall be responsible for quality control acceptance or rejection of materials and workmanship, and shall be currently certified as an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, " Standard for AWS Certification of Welding Inspectors."

The QC Inspector may be assisted by an Assistant QC Inspector provided that this individual is currently certified as an AWS Certified Associate Welding Inspector (CAWI) in conformance with the requirements in AWS QC1, "Standard for AWS Certification of Welding Inspectors." The Assistant QC Inspector may perform inspection under the direct supervision of the QC Inspector provided the Assistant is always within visible and audible range of the QC Inspector. The QC Inspector shall be responsible for signing all reports and for determining if welded materials conform to workmanship and acceptance criteria. The ratio of QC Assistants to QC Inspectors shall not exceed 5 to 1.

When the term "Inspector" is used without further qualification, it shall refer to the QC Inspector.

Section 6.14.6, "Personnel Qualification," of AWS D1.1, Section 7.8, "Personnel Qualification," of AWS D1.4, and Section 6.1.3.4, "Personnel Qualification," of AWS D1.5 are replaced with the following:

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports shall be either:

A. Certified NDT Level II technicians, or;
B. Level III technicians who hold a current ASNT Level III certificate in that discipline and are authorized and certified to perform the work of Level II technicians.

Section 6.5.4 of AWS D1.5 is replaced with the following:

The QC Inspector shall inspect and approve each joint preparation, assembly practice, welding technique, joint fit-up, and the performance of each welder, welding operator, and tack welder to make certain that the applicable requirements of this code and the approved Welding Procedure Specification (WPS) are met. The QC Inspector shall examine the work to make certain that it meets the requirements of Sections 3 and 6.26. The size and contour of all welds shall be measured using suitable gages. Visual inspection for cracks in welds and base metal, and for other discontinuities should be aided by strong light magnifiers, or such other devices as may be helpful. Acceptance criteria different from those specified in this code may be used when approved by the Engineer.

Section 6.6.5, "Nonspecified NDT Other than Visual," of AWS D1.1, Section 6.6.5 of AWS D1.4 and Section 6.6.5 of AWS D1.5 shall not apply.

For any welding, the Engineer may direct the Contractor to perform NDT that is in addition to the visual inspection or NDT specified in the AWS or other specified welding codes, in the Standard Specifications, or in these special provisions. Additional NDT required by the Engineer will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications. Should any welding deficiencies be discovered by this additional NDT, all costs associated with the repair of the deficient area, including NDT of the weld and of the weld repair, and any delays caused by the repair, shall be at the Contractor's expense.

Repair work to correct welding deficiencies discovered by visual inspection or NDT, or by additional NDT directed or performed by the Engineer, and any associated delays or expenses caused to the Contractor by performing these repairs, shall be at the Contractor's expense.

The Engineer shall have the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means approved by the Engineer.

Continuous inspection shall be provided when any welding is being performed. Continuous inspection, as a minimum, shall include having a QC Inspector within such close proximity of all welders or welding operators so that inspections by the QC Inspector of each welding operation at each welding location shall not lapse for a period exceeding 30 minutes.

Inspection and approval of all joint preparations, assembly practices, joint fit-ups, welding techniques, and the performance of each welder, welding operator, and tack welder shall be documented by the QC Inspector on a daily basis for each day welding is performed. For each inspection, including fit-up, Welding Procedure Specification (WPS) verification, and final weld inspection, the QC Inspector shall confirm and document compliance with the requirements of the AWS or other specified code criteria and the requirements of these special provisions on all welded joints before welding, during welding, and after the completion of each weld.

When joint weld details that are not prequalified to the details of Section 3 of AWS D1.1 or to the details of Figure 2.4 or 2.5 of AWS D1.5 are proposed for use in the work, the joint details, their intended locations, and the proposed welding parameters and essential variables, will be approved by the Engineer. The Engineer shall have 2 weeks to complete the review of the proposed joint detail locations. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. Upon approval of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details shall perform a qualification test plate using the WPS variables and the joint detail to be used in production. The test plate shall have the maximum thickness to be used in production and a minimum length of 180 mm and minimum finish welded width 460 mm. The test plate shall be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria shall be as specified in the applicable AWS codes.

In addition to the requirements specified in the applicable code, the period of effectiveness for a welder's or welding operator's qualification shall be a maximum of 3 years for the same weld process, welding position, and weld type. If

production welding will be performed without gas shielding, then qualification shall also be without gas shielding. Excluding welding of fracture critical members, a valid qualification at the beginning of work on a contract will be acceptable for the entire period of the contract, as long as the welder's or welding operator's work remains satisfactory.

The Engineer will witness all qualification tests for WPSs that were not previously approved by the Department. An approved independent third party will witness the qualification tests for welders or welding operators. The independent third party shall be a current CWI and shall not be employed by the contractor performing the welding. The Engineer shall have 2 weeks to review the qualifications and copy of the current certification of the independent third party. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications. The Contractor shall notify the Engineer one week prior to performing any qualification tests. Witnessing of qualification tests by the Engineer shall not constitute approval of the intended joint locations, welding parameters, or essential variables.

In addition to the requirements of AWS D1.5 Section 5.12 or 5.13, welding procedures qualification, for work welded in conformance with that code, shall conform to the following requirements:

A. Unless considered prequalified, fillet welds, including reinforcing fillet welds, shall be qualified in each position. The fillet weld soundness test shall be conducted using the essential variables of the WPS as established by the Procedure Qualification Record (PQR.)
B. For qualification of joints that do not conform to Figures 2.4 and 2.5 of AWS D1.5, two WPS qualification tests are required. The tests conforming to AWS D1.5 Section 5.13 shall be conducted using both Figure 5.1 and Figure 5.3. The test conforming to Figure 5.3 shall be conducted using the same welding electrical parameters that were established for the test conducted conforming to Figure 5.1.
C. The travel speed, current, and voltage values that are used for tests conducted per AWS D1.5 Section 5.12 or 5.13 shall be consistent for each weld joint, and shall in no case vary by more than 10 percent for travel speed, 10 percent for current, and 7 percent for voltage.
D. For a WPS qualified in conformance with AWS D1.5 Section 5.13, the values to be used for calculating ranges for current and voltage shall be based on the average of all weld passes made in the test. Heat input shall be calculated using the average of current and voltage of all weld passes made in the test for a WPS qualified in conformance with Section 5.12 or 5.13.
E. To qualify for unlimited material thickness, two qualification tests are required for WPSs utilized for welding material thicknesses greater than 38 mm. One test shall be conducted using 20-mm thick test plates, and one test shall be conducted using test plates with a thickness between 38 mm and 50 mm. Two maximum heat input tests may be conducted for unlimited thickness qualification.
F. Macroetch tests are required for WPS qualification tests, and acceptance shall be per AWS D1.5 Section 5.19.3.
G. When a weld joint is to be made using a combination of qualified WPSs, each process shall be qualified separately.
H. When a weld joint is to be made using a combination of qualified and prequalified processes, the WPS shall reflect both processes and the limitations of essential variables, including weld bead placement, for both processes.
I. Prior to preparing mechanical test specimens, the PQR welds shall be inspected by visual and radiographic tests. Backing bar shall be 75 mm in width and shall remain in place during NDT testing. Results of the visual and radiographic tests shall comply with AWS D1.5 Section 6.26.2, excluding Section 6.26.2.2. Test plates that do not comply with both tests shall not be used.

**WELDING QUALITY CONTROL**

Welding quality control shall conform to the requirements in the AWS or other specified welding codes, the Standard Specifications, and these special provisions.

Unless otherwise specified, welding quality control shall apply when any work is welded in conformance with the provisions in Section 52, "Reinforcement," Section 55, "Steel Structures," or Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications.

The welding of fracture critical members (FCMs) shall conform to the provisions specified in the Fracture Control Plan (FCP) and herein.

The Contractor shall designate in writing a welding Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of welding, including materials and workmanship, performed by the Contractor and subcontractors.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, reviewing, and approving all correspondence, required submittals, and reports to and from the Engineer. The QCM shall be a registered professional engineer or shall be currently certified as a CWI or a CAWI.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

Welding inspection personnel or NDT firms to be used in the work shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project, except for the following conditions:

A. The work is welded in conformance with AWS D1.5 and is performed at a permanent fabrication or manufacturing facility which is certified under the AISC Quality Certification Program, Category Cbr, Major Steel Bridges and Fracture Critical endorsement F.
B. The welding is performed on pipe pile material at a permanent pipe manufacturing facility authorized to apply the American Petroleum Institute (API) monogram for API 5L pipe.

For welding performed at such facilities, the inspection personnel or NDT firms may be employed or compensated by the facility performing the welding.

Prior to submitting the Welding Quality Control Plan (WQCP) required herein, a pre-welding meeting between the Engineer, the Contractor's QCM, and a representative from each entity performing welding or inspection for this project, shall be held to discuss the requirements for the WQCP.

The Contractor shall submit to the Engineer, in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, 2 copies of a separate WQCP for each subcontractor or supplier for each item of work for which welding is to be performed.

The Contractor shall allow the Engineer 2 weeks to review the WQCP submittal after a complete plan has been received. No welding shall be performed until the WQCP is approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

An amended WQCP or any addendum to the approved WQCP shall be submitted to, and approved in writing by the Engineer, for proposed revisions to the approved WQCP. An amended WQCP or addendum will be required for revisions to the WQCP, including but not limited to a revised WPS; additional welders; changes in NDT firms, QC, or NDT personnel or procedures; or updated systems for tracking and identifying welds. The Engineer shall have 1 week to complete the review of the amended WQCP or addendum. Work affected by the proposed revisions shall not be performed until the amended WQCP or addendum has been approved. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Information regarding the contents, format, and organization of a WQCP, is available at the Transportation Laboratory or the following website:

http://www.dot.ca.gov/hq/esc/Translab/smbresources.htm

After final approval of the WQCP, amended WQCP, or addendum, the Contractor shall submit 7 copies to the Engineer of the approved documents. A copy of the Engineer approved document shall be available at each location where welding is to be performed.

A daily production log for welding shall be kept for each day that welding is performed. The log shall clearly indicate the locations of all welding. The log shall include the welders' names, amount of welding performed, any problems or deficiencies discovered, and any testing or repair work performed, at each location. The daily report from each QC Inspector shall also be included in the log.

The following items shall be included in a Welding Report that is to be submitted to the Engineer within 10 days following the performance of any welding:

A. Reports of all visual weld inspections and NDT.
B. Radiographs and radiographic reports, and other required NDT reports.
C. Documentation that the Contractor has evaluated all radiographs and other nondestructive tests and corrected all rejectable deficiencies, and all repaired welds have been reexamined by the required NDT and found acceptable.
D. Daily production log.

The following information shall be clearly written on the outside of radiographic envelopes: name of the QCM, name of the nondestructive testing firm, name of the radiographer, date, contract number, complete part description, and all included

weld numbers or a report number, as detailed in the WQCP. In addition, all innerleaves shall have clearly written on them the part description and all included weld numbers, as detailed in the WQCP.

Reports regarding NDT shall be signed by both the NDT technician and the person that performed the review, and then submitted directly to the QCM for review and signature prior to submittal to the Engineer. Corresponding names shall be clearly printed or typewritten next to all signatures.

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 10 days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and in the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QC Inspector shall provide reports to the QCM on a daily basis for each day that welding is performed.

Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered, and also of the proposed repair procedures to correct them. The Contractor shall allow the Engineer one week to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The QCM shall sign and furnish to the Engineer, a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each item of work for which welding was performed. The certificate shall state that all of the materials and workmanship incorporated in the work, and all required tests and inspections of this work, have been performed in conformance with the details shown on the plans, the Standard Specifications, and these special provisions.

**PAYMENT**

Full compensation for conforming to the requirements of "Welding" shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

## SECTION 9. DESCRIPTION OF BRIDGE WORK

The bridge work to be done, in general, consists of replacing existing structure approach slabs or adding new approach slabs at various locations as shown on the plans.

## SECTION 10. CONSTRUCTION DETAILS

## SECTION 10-1. GENERAL

### 10-1.01 CONSTRUCTION PROJECT INFORMATION SIGNS

Before any major physical construction work readily visible to highway users is started on this contract, the Contractor shall furnish and erect 2 Type 2 Construction Project Information signs at the locations designated by the Engineer.

The signs and overlays shall be of a type and material consistent with the estimated time of completion of the project and shall conform to the details shown on the plans.

The sign letters, border and the Department's construction logos shall conform to the colors (non-reflective) and details shown on the plans, and shall be on a white background (non-reflective). The colors blue and orange shall conform to PR Color Number 3 and Number 6, respectively, as specified in the Federal Highway Administration's Color Tolerance Chart.

The sign message to be used for fund types shall consist of the following, in the order shown:

| |
|---|
| FEDERAL HIGHWAY TRUST FUNDS |
| STATE HIGHWAY FUNDS |

The sign message to be used for type of work shall consist of the following:

HIGHWAY REPAIR

The sign message to be used for the Year of Completion of Project Construction will be furnished by the Engineer. The Contractor shall furnish and install the "Year" sign overlay within 10 working days of notification of the year date to be used.

The letter sizes to be used shall be as shown on the plans. The information shown on the signs shall be limited to that shown on the plans.

The signs shall be kept clean and in good repair by the Contractor.

Upon completion of the work, the signs shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

Full compensation for furnishing, erecting, maintaining, and removing and disposing of the construction project information signs shall be considered as included in the contract lump sum price paid for construction area signs and no additional compensation will be allowed therefor.

**10-1.02 ORDER OF WORK**

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

Attention is directed to "Replace Concrete Pavement (Rapid Strength Concrete)" of these special provisions in regards to providing Pre-Operation Conference and the Just-In-Time Training prior to commencing pavement replacement operations.

Attention is directed to "Water Pollution Control" of these special provisions regarding the submittal and approval of the Water Pollution Control Program prior to performing work having potential to cause water pollution.

A first order of work shall be to replace concrete pavement (Rapid Strength Concrete) (slab replacement) followed by grinding existing concrete pavement as shown on the plans from southbound Route 5 connectors (southbound Route 5 to westbound Route 10, southbound Route 5 to eastbound Route 60, and southbound Route 5) and northbound Route 5 connectors (eastbound Route 10 to northbound Route 5 and westbound Route 60, Seventh Street onramp, and northbound thru traffic to Glendale Boulevard).

A first order of work shall be the construction of approach and departure Slabs on Route 5 , north of Route 2.

The Engineer shall be notified 21 days prior to work that will require call box relocation.

No more than 25 cubic meters of replace concrete pavement (Rapid Strength Concrete) shall be placed during the first concrete replacement work shift without the Engineer's prior approval.

Operations shall be scheduled so asphalt concrete pavement is placed over cold planed asphalt concrete areas prior to opening the cold planed areas to public traffic. If asphalt concrete pavement cannot be placed over cold planed asphalt concrete areas prior to opening the cold planed areas to public traffic, temporary asphalt concrete tapers as specified in "Cold Plane Asphalt Concrete Pavement" of these special provisions shall be utilized, except that no more than 2 days shall elapse between the time temporary asphalt concrete tapers at longitudinal and transverse edges are placed and the permanent surfacing is placed at the conform lines.

Crack sealant shall be applied after cold planing asphalt pavement and prior to paving operations.

A first order of work shall be to place the order for the communication system routing and perform the jointly conducted preconstruction check with the Engineer conforming to the requirements in "Maintaining Existing and Temporary Electrical Systems," of these special provisions, and as directed by the Engineer.

No later than 20 working days after approval of the contract, the Contractor shall submit to the Engineer a list of materials, including, but not limited to, fiber optic cable splice closures and fiber optic cables.

The Engineer will have 20 working days to review, comment, reject or approve the list of materials.

The Contractor shall resubmit new items for approval for rejected items within 10 working days.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions.

Attention is directed to "Progress Schedule (Critical Path Method)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

Before obliterating any pavement delineation (traffic stripes and pavement markers) that is to be replaced on the same alignment and location, as determined by the Engineer, the pavement delineation shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new pavement delineation. The references shall include the limits or changes in striping pattern. Full compensation for referencing existing pavement delineation shall be considered as included in the contract prices paid for new pavement delineation and no additional compensation will be allowed therefor.

At those locations exposed to public traffic where guard railings are to be constructed, reconstructed, or removed and replaced, the Contractor shall schedule operations so that at the end of each working day there shall be no post holes open nor shall there be any railing posts installed without the blocks and rail elements assembled and mounted thereon.

## 10-1.03 MATERIAL CONTAINING AERIALLY DEPOSITED LEAD

This work shall consist of handling material contaminated by aerially deposited lead in conformance with the Standard Specifications and these special provisions.

Aerially deposited lead is typically found within the top 0.6-m of material in unpaved areas within the highway right of way. Levels of lead found near the project limits range from less than 5.0 to 2 200 mg/kg total lead, as analyzed by EPA Test Method 6010 or EPA Test Method 7000 series.

After the Contractor has completed handling materials containing aerially deposited lead, in conformance with the plans, Standard Specifications, and these special provisions, the Contractor shall have no responsibility for such materials in place and shall not be obligated for further cleanup, removal, or remedial actions for such materials.

Handling material containing aerially deposited lead shall be in conformance with rules and regulations including, but not limited to, those of the following agencies:

California Division of Occupational Safety and Health Administration (Cal-OSHA)
California Regional Water Quality Control Board, Region 4.

Full compensation for conforming to the requirements of this section, except for the Lead Compliance Plan, shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

### LEAD COMPLIANCE PLAN

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling material containing aerially deposited lead. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning work in areas containing aerially deposited lead.

Prior to performing work in areas containing lead, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor, that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities, required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 6.

The contract lump sum price paid for Lead Compliance Plan shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in preparing the Lead Compliance Plan, including paying the Certified Industrial Hygienist, and for providing personal protective equipment, training and medical surveillance, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### SOIL HANDLING

Handling of materials containing aerially deposited lead shall result in no visible dust migration. The Contractor shall have a means of dust control available at all times while handling material in work areas containing aerially deposited lead.

The Contractor shall separate material from vegetation and the soils shall remain on site. This will not be required for vegetation removal performed during plant establishment.

Surplus material excavated from areas containing aerially deposited lead shall remain in the area of soil disturbance. The surplus soil shall not be disposed of outside the highway right of way.

Full compensation for handling material contaminated with aerially deposited lead, except as otherwise provided, shall be considered as included in the prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

## 10-1.04 WATER POLLUTION CONTROL

Water pollution control work shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications and these special provisions.

Water pollution control work shall conform to the requirements in the "Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual" and the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project. These manuals

are hereinafter referred to respectively as the "Preparation Manual" and the "Construction Site BMPs Manual," and collectively, as the "Manuals." Copies of the Manuals may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, 1900 Royal Oaks Drive, Sacramento, California 95815, Telephone: (916) 445-3520, and may also be obtained from the Department's Internet website at:

http://www.dot.ca.gov/hq/construc/stormwater.html.

The Contractor shall know and fully comply with applicable provisions of the Manuals, and Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from both the project site and areas of disturbance outside the project limits during construction. Attention is directed to Sections 7-1.01, "Laws to be Observed," and 7-1.12, "Indemnification and Insurance," of the Standard Specifications.

Water pollution control requirements shall apply to storm water and non-storm water discharges from areas outside the project site which are directly related to construction activities for this contract including, but not limited to, asphalt batch plants, material borrow areas, concrete plants, staging areas, storage yards and access roads. The Contractor shall comply with the Manuals for those areas and shall implement, inspect and maintain the required water pollution control practices. Installing, inspecting and maintaining water pollution control practices on areas outside the highway right of way not specifically arranged and provided for by the Department for the execution of this contract, will not be paid for.

The Contractor shall be responsible for penalties assessed or levied on the Contractor or the Department as a result of the Contractor's failure to comply with the provisions in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Manuals, and Federal, State and local regulations and requirements as set forth therein.

Penalties as used in this section shall include fines, penalties and damages, whether proposed, assessed, or levied against the Department or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of the Manuals, or applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

**RETENTION OF FUNDS**

Notwithstanding any other remedies authorized by law, the Department may retain money due the Contractor under the contract, in an amount determined by the Department, up to and including the entire amount of Penalties proposed, assessed, or levied as a result of the Contractor's violation of the Manuals, or Federal or State law, regulations or requirements. Funds may be retained by the Department until final disposition has been made as to the Penalties. The Contractor shall remain liable for the full amount of Penalties until such time as they are finally resolved with the entity seeking the Penalties.

Retention of funds for failure to conform to the provisions in this section, "Water Pollution Control," shall be in addition to the other retention amounts required by the contract. The amounts retained for the Contractor's failure to conform to provisions in this section will be released for payment on the next monthly estimate for partial payment following the date when an approved WPCP has been implemented and maintained, and when water pollution has been adequately controlled, as determined by the Engineer.

When a regulatory agency identifies a failure to comply with the Manuals, or other Federal, State or local requirements, the Department may retain money due the Contractor, subject to the following:

A. The Department will give the Contractor 30 days notice of the Department's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.
B. No retention of additional amounts out of partial payments will be made if the amount to be retained does not exceed the amount being withheld from partial payments pursuant to Section 9-1.06, "Partial Payments," of the Standard Specifications.
C. If the Department has retained funds, and it is subsequently determined that the State is not subject to the entire amount of the Costs and Liabilities assessed or proposed in connection with the matter for which the retention was made, the Department shall be liable for interest on the amount retained for the period of the retention. The interest rate payable shall be 6 percent per annum.

During the first estimate period that the Contractor fails to conform to the provisions in this section, "Water Pollution Control," the Department may retain an amount equal to 25 percent of the estimated value of the contract work performed.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to water pollution control work. The Contractor and the Department shall provide copies of correspondence, notices of violations, enforcement actions or proposed fines by regulatory agencies to the requesting regulatory agency.

**WATER POLLUTION CONTROL PROGRAM PREPARATION, APPROVAL AND AMENDMENTS**

As part of the water pollution control work, a Water Pollution Control Program (WPCP) is required for this contract. The WPCP shall conform to the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications, the requirements in the Manuals, and these special provisions. Upon the Engineer's approval of the WPCP, the WPCP shall be considered to fulfill the provisions in Section 7-1.01G, "Water Pollution," of the Standard Specifications for development and submittal of a Water Pollution Control Program.

No work having potential to cause water pollution, shall be performed until the WPCP has been approved by the Engineer. Approval shall not constitute a finding that the WPCP complies with applicable requirements of the Manuals and applicable Federal, State and local laws, regulations, and requirements.

The Contractor shall designate a Water Pollution Control Manager. The Water Pollution Control Manager shall be responsible for the preparation of the WPCP and required modifications or amendments, and shall be responsible for the implementation and adequate functioning of the various water pollution control practices employed. The Contractor may designate different Water Pollution Control Managers to prepare the WPCP and to implement the water pollution control practices. The Water Pollution Control Managers shall serve as the primary contact for issues related to the WPCP or its implementation. The Contractor shall assure that the Water Pollution Managers have adequate training and qualifications necessary to prepare the WPCP, implement and maintain water pollution control practices.

Within 10 working days after the approval of the contract, the Contractor shall submit 3 copies of the draft WPCP to the Engineer. The Engineer will have 10 working days to review the WPCP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the WPCP within 10 working days of receipt of the Engineer's comments. The Engineer will have 5 working days to review the revisions. Upon the Engineer's approval of the WPCP, 4 approved copies of the WPCP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the WPCP while minor revisions are being completed. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for resulting losses, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The WPCP shall incorporate water pollution control practices in the following categories:

A. Soil stabilization.
B. Sediment control.
C. Wind erosion control.
D. Tracking control.
E. Non-storm water management.
F. Waste management and materials pollution control.

The Contractor shall develop a Water Pollution Control Schedule that describes the timing of grading or other work activities that could affect water pollution. The Water Pollution Control Schedule shall be updated by the Contractor to reflect changes in the Contractor's operations that would affect the necessary implementation of water pollution control practices.

The Contractor shall complete the BMP checklists for each of the six categories presented in Section 3 of the Preparation Manual and shall incorporate the completed checklists and water pollution control practices into Sections 30.1, 30.2, and 30.3 of the WPCP. Water pollution control practices include the "Minimum Requirements" and other Contractor-selected water pollution control practices from the BMP checklists and "Project-Specific Minimum Requirements" identified in the Water Pollution Control Cost Break-Down of this section.

The WPCP shall include, but not be limited to, the items described in the Manuals and related information contained in the contract documents.

The Contractor shall prepare an amendment to the WPCP when there is a change in construction activities or operations which may affect the discharge of pollutants to surface waters, ground waters, municipal storm drain systems, or when the Contractor's activities or operations violate Federal, State or local regulations, or when directed by the Engineer. Amendments shall identify additional water pollution control practices or revised operations, including those areas or operations not identified in the initially approved WPCP. Amendments to the WPCP shall be prepared and submitted for review and approval within a time approved by the Engineer, but in no case longer than the time specified for the initial submittal and review of the WPCP.

The Contractor shall keep one copy of the approved WPCP and approved amendments at the project site. The WPCP shall be made available upon request by a representative of the Regional Water Quality Control Board, State Water Resources Control Board, United States Environmental Protection Agency, or the local storm water management agency. Requests by the public shall be directed to the Engineer.

**COST BREAK-DOWN**

The Contractor shall include a Water Pollution Control Cost Break-Down in the WPCP which itemizes the contract lump sum for water pollution control work. The Contractor shall use the Water Pollution Control Cost Break-Down provided in this section as the basis for the cost break-down submitted with the WPCP. The Contractor shall use the Water Pollution Control Cost Break-Down to identify items, quantities and values for water pollution control work, excluding Temporary Water Pollution Control Practices for which there is a separate bid item. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted with the WPCP. Partial payment for the item of water pollution control will not be made until the Water Pollution Control Cost Break-Down is approved by the Engineer.

Attention is directed to "Time-Related Overhead" of these special provisions regarding compensation for time-related overhead.

Line items indicated in the Water Pollution Control Cost Break-Down in this section with a specified Estimated Quantity shall be considered a "Project-Specific Minimum Requirement." The Contractor shall incorporate the items with Contractor-designated quantities and values into the Water Pollution Control Cost Break-Down submitted with the WPCP.

Line items indicated in the Water Pollution Control Cost Break-Down in this section without a specified Estimated Quantity shall be considered by the Contractor for selection to meet the applicable "Minimum Requirements" as defined in the Manuals, or for other water pollution control work as identified in the BMP checklists presented in Section 3 of the Preparation Manual. In the Water Pollution Control Cost Break-Down submitted with the WPCP, the Contractor shall list only those water pollution control practices selected for the project, including quantities and values required to complete the work for those items.

The sum of the amounts for the items of work listed in the Water Pollution Control Cost Break-Down shall be equal to the contract lump sum price bid for water pollution control. Overhead and profit, except for time-related overhead, shall be included in each individual item listed in the cost break-down.

**WATER POLLUTION CONTROL COST BREAK-DOWN**

**Contract No. 07-193104**

| ITEM | ITEM DESCRIPTION | UNIT | ESTIMATED QUANTITY | VALUE | AMOUNT |
|---|---|---|---|---|---|
| SS-3 | Hydraulic Mulch | M2 | | | |
| SS-4 | Hydroseeding | M2 | | | |
| SS-5 | Soil Binders | M2 | | | |
| SS-6 | Straw Mulch | M2 | | | |
| SS-7 | Geotextiles, Plastic Covers & Erosion Control Blankets/Mats | M2 | | | |
| SS-8 | Wood Mulching | M2 | | | |
| SS-9 | Earth Dikes/Drainage Swales & Lined Ditches | M | | | |
| SS-10 | Outlet Protection/Velocity Dissipation Devices | EA | | | |
| SS-11 | Slope Drains | EA | | | |
| SS-12 | Streambank Stabilization | LS | | | |
| SC-1 | Silt Fence | M | | | |
| SC-2 | Desilting Basin | EA | | | |
| SC-3 | Sediment Trap | EA | | | |
| SC-4 | Check Dam | EA | | | |
| SC-5 | Fiber Rolls | M | | | |
| SC-6 | Gravel Bag Berm | M | | | |
| SC-7 | Street Sweeping and Vacuuming | LS | LUMP SUM | | |
| SC-8 | Sandbag Barrier | M | | | |
| SC-9 | Straw Bale Barrier | M | | | |
| SC-10 | Storm Drain Inlet Protection | EA | | | |
| WE-1 | Wind Erosion Control | LS | LUMP SUM | | |
| TC-1 | Stabilized Construction Entrance/Exit | EA | | | |
| TC-2 | Stabilized Construction Roadway | EA | | | |
| TC-3 | Entrance/Outlet Tire Wash | EA | | | |
| NS-1 | Water Conservation Practices | LS | | | |
| NS-2 | Dewatering Operations | EA | | | |
| NS-3 | Paving and Grinding Operations | LS | LUMP SUM | | |
| NS-4 | Temporary Stream Crossing | EA | | | |

| ITEM | ITEM DESCRIPTION | UNIT | ESTIMATED QUANTITY | VALUE | AMOUNT |
|---|---|---|---|---|---|
| NS-5 | Clear Water Diversion | EA | | | |
| NS-6 | Illicit Connection/Illegal Discharge Detection and Reporting | LS | LUMP SUM | | |
| NS-7 | Potable Water/Irrigation | LS | | | |
| NS-8 | Vehicle and Equipment Cleaning | LS | LUMP SUM | | |
| NS-9 | Vehicle and Equipment Fueling | LS | LUMP SUM | | |
| NS-10 | Vehicle and Equipment Maintenance | LS | | | |
| NS-11 | Pile Driving Operations | LS | | | |
| NS-12 | Concrete Curing | LS | LUMP SUM | | |
| NS-13 | Material and Equipment Use over Water | LS | | | |
| NS-14 | Concrete Finishing | LS | LUMP SUM | | |
| NS-15 | Structure Demolition/Removal Over or Adjacent to Water | LS | | | |
| WM-1 | Material Delivery and Storage | LS | LUMP SUM | | |
| WM-2 | Material Use | LS | LUMP SUM | | |
| WM-3 | Stockpile Management | LS | LUMP SUM | | |
| WM-4 | Spill Prevention and Control | LS | LUMP SUM | | |
| WM-5 | Solid Waste Management | LS | LUMP SUM | | |
| WM-6 | Hazardous Waste Management | LS | | | |
| WM-7 | Contaminated Soil Management | LS | | | |
| WM-8 | Concrete Waste Management | LS | LUMP SUM | | |
| WM-9 | Sanitary/Septic Waste Management | LS | LUMP SUM | | |
| WM-10 | Liquid Waste Management | LS | | | |

**TOTAL** _____

Adjustments in the items of work and quantities listed in the approved cost break-down shall be made when required to address amendments to the WPCP, except when the adjusted items are paid for as extra work.

No adjustment in compensation will be made to the contract lump sum price paid for water pollution control due to differences between the quantities shown in the approved cost break-down and the quantities required to complete the work as shown on the approved WPCP. No adjustment in compensation will be made for ordered changes to correct WPCP work resulting from the Contractor's own operations or from the Contractor's negligence.

The approved cost break-down will be used to determine partial payments during the progress of the work and as the basis for calculating the adjustment in compensation for the item of water pollution control due to increases or decreases of quantities ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down item, the adjustment in compensation will be determined in the same manner specified for increases and decreases in the quantity of a contract item of work in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications. If an ordered change requires a new item which is not on the approved cost break-down, the adjustment in compensation will be determined in the same manner specified for extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including addition of new water pollution control practices, will be allowed. Changes shall be included in the approved amendment of the WPCP. If the requested changes result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the water pollution control item. The net cost increase to the water pollution control item will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

## WPCP IMPLEMENTATION

Unless otherwise specified, upon approval of the WPCP, the Contractor shall be responsible throughout the duration of the project for installing, constructing, inspecting, maintaining, removing, and disposing of the water pollution control practices specified in the WPCP and in the amendments. Unless otherwise directed by the Engineer, the Contractor's responsibility for WPCP implementation shall continue throughout any temporary suspension of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. Requirements for installation, construction, inspection, maintenance, removal, and disposal of water pollution control practices shall conform to the requirements in the Manuals and these special provisions.

If the Contractor or the Engineer identifies a deficiency in the implementation of the approved WPCP or amendments, the deficiency shall be corrected immediately. The deficiency may be corrected at a later date and time if requested by the Contractor and approved by the Engineer in writing, but shall be corrected prior to the onset of precipitation. If the Contractor fails to correct the identified deficiency by the date agreed or prior to the onset of precipitation, the project shall be in nonconformance with this section. Attention is directed to Section 5-1.01, "Authority of Engineer," of the Standard Specifications, and to "Retention of Funds" of this section for possible nonconformance penalties.

If the Contractor fails to conform to the provisions of this section, "Water Pollution Control," the Engineer may order the suspension of construction operations until the project complies with the requirements of this section.

Implementation of water pollution control practices may vary by season. The Construction Site BMPs Manual and these special provisions shall be followed for control practice selection of year-round, rainy season and non-rainy season water pollution control practices.

### Year-Round Implementation Requirements

The Contractor shall have a year-round program for implementing, inspecting and maintaining water pollution control practices for wind erosion control, tracking control, non-storm water management, and waste management and materials pollution control.

The National Weather Service weather forecast shall be monitored and used by the Contractor on a daily basis. An alternative weather forecast proposed by the Contractor may be used if approved by the Engineer. If precipitation is predicted, the necessary water pollution control practices shall be deployed prior to the onset of the precipitation.

Disturbed soil areas shall be considered active whenever the soil disturbing activities have occurred, continue to occur or will occur during the ensuing 21 days. Nonactive areas shall be protected as prescribed in the Construction Site BMPs Manual within 14 days of cessation of soil disturbing activities or prior to the onset of precipitation, whichever occurs first.

### Rainy Season Implementation Requirements

Soil stabilization and sediment control practices conforming to the requirements of these special provisions shall be provided throughout the rainy season, defined as between October 1 and May 1.

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed no later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the

soil stabilization and sediment control practices and the dates when the implementation will be 25 percent, 50 percent and 100 percent complete, respectively. For construction activities beginning during the rainy season, the Contractor shall implement applicable soil stabilization and sediment control practices.

**Non-Rainy Season Implementation Requirements**

The non-rainy season shall be defined as days outside the defined rainy season. The Contractor's attention is directed to the Construction Site BMPs Manual for soil stabilization and sediment control implementation requirements on disturbed soil areas during the non-rainy season. Disturbed soil areas within the project shall be protected in conformance with the requirements in the Construction Site BMPs Manual with an effective combination of soil stabilization and sediment control.

**MAINTENANCE**

To ensure the proper implementation and functioning of water pollution control practices, the Contractor shall regularly inspect and maintain the construction site for the water pollution control practices identified in the WPCP. The construction site shall be inspected by the Contractor as follows:

A. Prior to a forecast storm.
B. After a precipitation event which causes site runoff.
C. At 24 hour intervals during extended precipitation events.
D. Routinely, a minimum of once every two weeks outside of the defined rainy season.
E. Routinely, a minimum of once every week during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the Preparation Manual or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

**REPORTING REQUIREMENTS**

**Report of Discharges, Notices or Orders**

If the Contractor identifies discharges into surface waters or drainage systems in a manner causing, or potentially causing, a condition of pollution, or if the project receives a written notice or order from a regulatory agency, the Contractor shall immediately inform the Engineer. The Contractor shall submit a written report to the Engineer within 3 days of the discharge event, notice or order. The report shall include the following information:

A. The date, time, location, nature of the operation, and type of discharge, including the cause or nature of the notice or order.
B. The water pollution control practices deployed before the discharge event, or prior to receiving the notice or order.
C. The date of deployment and type of water pollution control practices deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent reoccurrence.
D. An implementation and maintenance schedule for affected water pollution control practices.

**Report of First-Time Non-Storm Water Discharge**

The Contractor shall notify the Engineer at least 7 days in advance of first-time non-storm water discharge events. The Contractor shall notify the Engineer of the operations causing non-storm water discharges and shall obtain field approval for first-time non-storm water discharges. Non-storm water discharges shall be monitored at first-time occurrences and routinely thereafter.

**PAYMENT**

The contract lump sum price paid for prepare water pollution control program shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work involved in developing, preparing, obtaining approval of, revising, and amending the WPCP, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Attention is directed to Section 9-1.06, "Partial Payments," and Section 9-1.07, "Payment After Acceptance," of the Standard Specifications. Payments for Prepare Water Pollution Control Program will be made as follows:

A. After the WPCP has been approved by the Engineer, 75 percent of the contract item price for Prepare Water Pollution Control Program will be included in the monthly partial payment estimate.

B. After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, payment for the remaining 25 percent of the contract item price for Prepare Water Pollution Control Program will be made in conformance with the provisions in Section 9-1.07.

The contract lump sum price paid for water pollution control shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing, constructing, maintaining, removing, and disposing of water pollution control practices, including non-storm water management, and waste management and materials pollution water pollution control practices, except those for which there is a contract item of work as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Water pollution control practices for which there is a contract item of work will be measured and paid for as that contract item of work.

## 10-1.05 COOPERATION

Attention is directed to Section 7-1.14, "Cooperation," and Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

It is anticipated that work by another contractor (Contract No. 07-213704) to Resurface Existing Highway in Los Angeles County on Route 2 from KP 22.5 to KP 38.6 may be in progress adjacent to or within the limits of this project during progress of the work on this contract.

## 10-1.06 SOLID WASTE DISPOSAL AND RECYCLING REPORT

This work shall consist of reporting disposal and recycling of construction solid waste, as specified in these special provisions. For the purposes of this section, solid waste includes construction and demolition waste debris, but not hazardous waste.

Annually by the fifteenth day of January, the Contractor shall complete and certify Form CEM-2025, "Solid Waste Disposal and Recycling Report," which quantifies solid waste generated by the work performed and disposed of in landfills or recycled during the previous calendar year. The amount and type of solid waste disposed of or recycled shall be reported in either metric tonnes or cubic meters. The Contractor shall also complete and certify Form CEM-2025 within 5 days following contract acceptance.

Form CEM-2025, "Solid Waste Disposal and Recycling Report" can be downloaded from the following website:

http://www.dot.ca.gov/hq/construc/manual2001

If the Contractor has not submitted Form CEM-2025, by the dates specified above, the Department will withhold the amount of $10 000 for each missing or incomplete report. The moneys withheld will be released for payment on the next monthly estimate for partial payment following the date that a complete and acceptable Form CEM-2025 is submitted to the Engineer. Upon completion of all contract work and submittal of the final Form CEM-2025, remaining withheld funds associated with this section, "Solid Waste Disposal and Recycling Report," will be released for payment. Withheld funds in conformance with this section shall be in addition to other moneys withheld provided for in the contract. No interest will be due the Contractor on withheld amounts.

Full compensation for preparing and submitting Form CEM-2025, "Solid Waste Disposal and Recycling Report," shall be considered as included in the contract price for the various items of work involved and no additional compensation will be allowed therefor.

## 10-1.07 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

The Contractor shall submit to the Engineer practicable critical path method (CPM) progress schedules in conformance with these special provisions. Whenever the term "schedule" is used in this section it shall mean CPM progress schedule.

Attention is directed to "Payments" of Section 5 of these special provisions.

The provisions in Section 8-1.04, "Progress Schedule," of the Standard Specifications shall not apply.

### DEFINITIONS

The following definitions shall apply to this section:

A. ACTIVITY.—A task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration and one or more logic ties.
B. BASELINE SCHEDULE.—The initial schedule representing the Contractor's work plan on the first working day of the project.

C. CONTRACT COMPLETION DATE.—The current extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in conformance with the provisions in Section 8-1.06, "Time of Completion," of the Standard Specifications.
D. CRITICAL PATH.—The longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
E. CRITICAL PATH METHOD (CPM).—A network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
F. DATA DATE.—The day after the date through which a schedule is current. Everything occurring earlier than the data date is "as-built" and everything on or after the data date is "planned."
G. EARLY COMPLETION TIME.—The difference in time between an early scheduled completion date and the contract completion date.
H. FLOAT.—The difference between the earliest and latest allowable start or finish times for an activity.
I. MILESTONE.—An event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
J. NARRATIVE REPORT.—A document submitted with each schedule that discusses topics related to project progress and scheduling.
K. NEAR CRITICAL PATH.—A chain of activities with total float exceeding that of the critical path but having no more than 10 working days of total float.
L. SCHEDULED COMPLETION DATE.—The planned project finish date shown on the current accepted schedule.
M. STATE OWNED FLOAT ACTIVITY.—The activity documenting time saved on the critical path by actions of the State. It is the last activity prior to the scheduled completion date.
N. TIME IMPACT ANALYSIS.—A schedule and narrative report developed specifically to demonstrate what effect a proposed change or delay has on the current scheduled completion date.
O. TOTAL FLOAT.—The amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
P. UPDATE SCHEDULE.—A current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

**GENERAL REQUIREMENTS**

The Contractor shall submit to the Engineer baseline, monthly update and final update schedules, each consistent in all respects with the time and order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities, and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams, narrative reports, tabular reports and schedule data as parts of each schedule submittal.

Schedules shall include, but not be limited to, activities that show the following that are applicable to the project:

A. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
B. Project start date, scheduled completion date and other milestones.
C. Work performed by the Contractor, subcontractors and suppliers.
D. Submittal development, delivery, review and approval, including those from the Contractor, subcontractors and suppliers.
E. Procurement, delivery, installation and testing of materials, plants and equipment.
F. Testing and settlement periods.
G. Utility notification and relocation.
H. Erection and removal of falsework and shoring.
I. Major traffic stage switches.
J. Finishing roadway and final cleanup.
K. State-owned float as the predecessor activity to the scheduled completion date.

Schedules shall have not less than 50 and not more than 500 activities, unless otherwise authorized by the Engineer. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.

Schedule activities shall include the following:

A. A clear and legible description.
B. Start and finish dates.
C. A duration of not less than one working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
D. At least one predecessor and one successor activity, except for project start and finish milestones.
E. Required constraints.
F. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

The Contractor may show early completion time on any schedule provided that the requirements of the contract are met. Early completion time shall be considered a resource for the exclusive use of the Contractor. The Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned. The Contractor may also submit for approval a cost reduction incentive proposal in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications that will reduce time of construction.

The Contractor may show a scheduled completion date that is later than the contract completion date on an update schedule, after the baseline schedule is accepted. The Contractor shall provide an explanation for a late scheduled completion date in the narrative report that is included with the schedule.

State-owned float shall be considered a resource for the exclusive use of the State. The Engineer may accrue State-owned float by the early completion of review of any type of required submittal when it saves time on the critical path. The Contractor shall prepare a time impact analysis, when requested by the Engineer, to determine the effect of the action in conformance with the provisions in "Time Impact Analysis" specified herein. The Engineer will document State-owned float by directing the Contractor to update the State-owned float activity on the next update schedule. The Contractor shall include a log of the action on the State-owned float activity and include a discussion of the action in the narrative report. The Engineer may use State-owned float to mitigate past, present or future State delays by offsetting potential time extensions for contract change orders.

The Engineer may adjust contract working days for ordered changes that affect the scheduled completion date, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications. The Contractor shall prepare a time impact analysis to determine the effect of the change in conformance with the provisions in "Time Impact Analysis" specified herein, and shall include the impacts acceptable to the Engineer in the next update schedule. Changes that do not affect the controlling operation on the critical path will not be considered as the basis for a time adjustment. Changes that do affect the controlling operation on the critical path will be considered by the Engineer in decreasing time or granting an extension of time for completion of the contract. Time extensions will only be granted if the total float is absorbed and the scheduled completion date is delayed one or more working days because of the ordered change.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within 5 working days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

**COMPUTER SOFTWARE**

The Contractor shall submit to the Engineer for approval a description of proposed software before delivery. The software shall be the current version of Primavera SureTrak Project Manager for Windows, or equal, and shall be compatible with Windows NT (version 4.0) operating system. If software other than SureTrak is proposed, it shall be capable of generating files that can be imported into SureTrak.

The Contractor shall furnish schedule software and all original software instruction manuals to the Engineer with submittal of the baseline schedule. The furnished schedule software shall become the property of the State and will not be returned to the Contractor. The State will compensate the Contractor in conformance with the provisions in Section 4-1.03, "Extra Work," of the Standard Specifications for replacement of software which is damaged, lost or stolen after delivery to the Engineer.

The Contractor shall instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within 20 working days of contract approval, the Contractor shall provide a commercial 8-hour training session for 2 Department employees in the use of the software at a location acceptable to the Engineer. It is recommended that the Contractor also send at least 2 employees to the same training session to facilitate development of similar knowledge and

skills in the use of the software. If software other than SureTrak is furnished, then the training session shall be a total of 16-hours for each Department employee.

**NETWORK DIAGRAMS, REPORTS AND DATA**

The Contractor shall include the following for each schedule submittal:

A. Two sets of originally plotted, time-scaled network diagrams.
B. Two copies of a narrative report.
C. Two copies of each of 3 sorts of the CPM software-generated tabular reports.
D. One 1.44-megabyte 90 mm (3.5 inch) floppy diskette containing the schedule data.

The time-scaled network diagrams shall conform to the following:

A. Show a continuous flow of information from left to right.
B. Be based on early start and early finish dates of activities.
C. Clearly show the primary paths of criticality using graphical presentation.
D. Be prepared on E-size sheets, 860 mm x 1120 mm (34 inch x 44 inch).
E. Include a title block and a timeline on each page.

The narrative report shall be organized in the following sequence with all applicable documents included:

A. Contractor's transmittal letter.
B. Work completed during the period.
C. Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than regular days or hours.
D. Description of the current critical path.
E. Changes to the critical path and scheduled completion date since the last schedule submittal.
F. Description of problem areas.
G. Current and anticipated delays:

    1. Cause of delay.
    2. Impact of delay on other activities, milestones and completion dates.
    3. Corrective action and schedule adjustments to correct the delay.

H. Pending items and status thereof:

    1. Permits
    2. Change orders
    3. Time adjustments
    4. Non-compliance notices

I. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity number, (2) early start and (3) total float. Tabular reports shall be 215 mm x 280 mm (8 1/2 inch x 11 inch) in size and shall include, as a minimum, the following applicable information:

A. Data date
B. Activity number and description
C. Predecessor and successor activity numbers and descriptions
D. Activity codes
E. Scheduled, or actual and remaining durations (work days) for each activity
F. Earliest start (calendar) date
G. Earliest finish (calendar) date
H. Actual start (calendar) date
I. Actual finish (calendar) date
J. Latest start (calendar) date
K. Latest finish (calendar) date

L. Free float (work days)
M. Total float (work days)
N. Percentage of activity complete and remaining duration for incomplete activities.
O. Lags
P. Required constraints

Schedule submittals will only be considered complete when all documents and data have been provided as described above.

**PRE-CONSTRUCTION SCHEDULING CONFERENCE**

The Contractor shall schedule and the Engineer will conduct a pre-construction scheduling conference with the Contractor's project manager and construction scheduler within 10 working days of the approval of the contract. At this meeting the Engineer will review the requirements of this section of the special provisions with the Contractor.

The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions. If the Contractor proposes deviations to the construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts. The Contractor shall be prepared to discuss the proposal.

At this meeting, the Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities. To easily identify relationships, each activity description shall indicate its associated scope or location of work by including such terms as quantity of material, type of work, bridge number, station to station location, side of highway (such as left, right, northbound, southbound), lane number, shoulder, ramp name, ramp line descriptor or mainline.

The Engineer will review the logic diagram, coding structure, and activity identification system, and provide any required baseline schedule changes to the Contractor for implementation.

**BASELINE SCHEDULE**

Beginning the week following the pre-construction scheduling conference, the Contractor shall meet with the Engineer weekly until the baseline schedule is accepted by the Engineer to discuss schedule development and resolve schedule issues.

The Contractor shall submit to the Engineer a baseline schedule within 20 working days of approval of the contract. The Contractor shall allow 3 weeks for the Engineer's review after the baseline schedule and all support data are submitted. In addition, the baseline schedule submittal will not be considered complete until the computer software is delivered and installed for use in review of the schedule.

The baseline schedule shall include the entire scope of work and how the Contractor plans to complete all work contemplated. The baseline schedule shall show the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum. A total of not more than 50 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the Engineer.

The baseline schedule shall not extend beyond the number of working days specified in these special provisions. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable.

**UPDATE SCHEDULE**

The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow 2 weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until the previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a data date of the twenty-first day of the month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned.

Actual activity start dates, percent complete and finish dates shall be shown as applicable. Durations for work that has been completed shall be shown on the update schedule as the work actually occurred, including Engineer submittal review and Contractor resubmittal times.

The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations or logic that do not (1) alter the critical path(s) or near critical path(s) or (2) extend the scheduled completion date compared to that shown on the current accepted schedule. The Contractor shall state in writing the reasons for any changes to planned work. If any proposed changes in planned work will result in (1) or (2) above, then the Contractor shall submit a time impact analysis as described herein.

**TIME IMPACT ANALYSIS**

The Contractor shall submit a written time impact analysis (TIA) to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.

The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.

The Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer. The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.

If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule. The Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by the Engineer and not submitted by the Contractor within 15 working days. The schedule item payment will resume on the next estimate after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

**FINAL UPDATE SCHEDULE**

The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within 30 days after completion of contract work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

**RETENTION**

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these special provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)", will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

**PAYMENT**

Progress schedule (critical path method) will be paid for at a lump sum price. The contract lump sum price paid for progress schedule (critical path method) shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for the progress schedule (critical path method) contract item will be made progressively as follows:

A. A total of 25 percent of the item amount or a total of 25 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon achieving all of the following:

   1. Completion of 5 percent of all contract item work.
   2. Acceptance of all schedules and TIAs required to the time when 5 percent of all contract item work is complete.
   3. Delivery of schedule software to the Engineer.
   4. Completion of required schedule software training.

B. A total of 50 percent of the item amount or a total of 50 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 25 percent of all contract item work is complete.
C. A total of 75 percent of the item amount or a total of 75 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and TIAs required to the time when 50 percent of all contract item work is complete.
D. A total of 100 percent of the item amount or a total of 100 percent of the amount listed for progress schedule (critical path method) in "Payments" of Section 5 of these special provisions, whichever is less, will be paid upon completion of all contract item work, acceptance of all schedules and TIAs required to the time when all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in compensation in conformance with the provisions in Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

**10-1.08 TIME-RELATED OVERHEAD**

The Contractor will be compensated for time-related overhead as described below and in conformance with “Force Account Payment” of these special provisions. The Contractor will not be compensated for time-related overhead for delays to the controlling operations caused by the Engineer that occur prior to the first working day, but will be compensated for actual overhead costs incurred, as determined by an independent Certified Public Accountant audit examination and report.

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages," "Force Account Payment," and "Progress Schedule (Critical Path Method)" of these special provisions.

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and other charges incurred only once during the contract. Time-related overhead shall not apply to subcontractors of any tier, suppliers, fabricators, manufacturers, or other parties associated with the Contractor.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to the work of the contract. Time-related costs of field office overhead include, but are not limited to, salaries, benefits, and equipment costs of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies, and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. Home office overhead costs shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of time-related overhead associated with a reduction in contract time for cost reduction incentive proposals accepted and executed in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications shall be considered a construction cost attributable to the resultant estimated net savings due to the cost reduction incentive.

If the final increased quantity of time-related overhead exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead

costs. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.

Independent Certified Public Accountant's audit examinations shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. Audit examinations and reports shall determine if the rates of field office overhead and home office overhead are:

A. Allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31.
B. Adequately supported by reliable documentation.
C. Related solely to the project under examination.

Within 20 days of receipt of the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer requests the independent Certified Public Accountant audit, or if it is requested in writing by the Contractor, the contract item payment rate for time-related overhead, in excess of 149 percent of the number of working days specified in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an independent Certified Public Accountant audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination and report in conformance with the provisions of Section 9-1.03B, "Work Performed by Special Forces or Other Special Services," of the Standard Specifications, and paying to the Contractor one-half of that cost. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report for overhead claims other than for the purpose of verifying the actual rate of time-related overhead shall be entirely borne by the Contractor. The cost of performing an audit examination and submitting the independent Certified Public Accountant audit report to verify actual overhead costs incurred prior to the first working day shall be entirely borne by the Contractor.

The quantity of time-related overhead to be paid will be measured by the working day, designated in the Engineer's Estimate as WDAY. The estimated number of working days is the number of working days, excluding days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. The quantity of time-related overhead will be increased or decreased only as a result of suspensions or adjustments of contract time which revise the current contract completion date, and which satisfy any of the following criteria:

A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations.
    2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform the provisions of the contract.
    3. Suspensions ordered due to factors beyond the control of and not caused by the State or the Contractor, for which the Contractor is granted extensions of time in conformance with the provisions of the third paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications.
    4. Other suspensions that mutually benefit the State and the Contractor.

B. Extensions of contract time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.
C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path Method)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the amount of time-related overhead eligible for payment will be based on the total number of working days for the project, in conformance with the provisions in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule.

The contract price paid per working day for time-related overhead shall include full compensation for time-related overhead, including the Contractor's share of costs of the independent Certified Public Accountant audit of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer.

The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to the contract item of time-related overhead.

Full compensation for additional overhead costs incurred during days of inclement weather when the contract work is extended into additional construction seasons due to delays caused by the State shall be considered as included in the time-related overhead paid during the contract working days, and no additional compensation will be allowed therefor.

Full compensation for additional overhead costs involved in performing additional contract item work that is not a controlling operation shall be considered as included in the contract items of work involved and no additional compensation will be allowed therefor.

Full compensation for overhead, other than time-related overhead measured and paid for as specified above, and other than overhead costs included in the markups specified in "Force Account Payment" of these special provisions, shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

Overhead costs incurred by subcontractors of any tier, suppliers, fabricators, manufacturers, and other parties associated with the Contractor shall be considered as included in the various items of work and as specified in Section 9-1.03, “Force Account Payment,” of the Standard Specifications.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment that occurred during that monthly estimate period, including compensable suspensions and right of way delays. Working days granted by contract change order due to extra work or changes in character of the work, will be paid for upon completion of the contract. The amount earned per working day for time-related overhead shall be the lesser of the following amounts:

A. The contract item price.
B. Twenty percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions.

After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount of the total contract item price for time-related overhead not yet paid, will be included for payment in the first estimate made after acceptance of the contract in conformance with the provisions in Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

**10-1.09 OBSTRUCTIONS**

Attention is directed to Section 8-1.10, "Utility and Non-Highway Facilities," and Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to the existence of certain underground facilities that may require special precautions be taken by the Contractor to protect the health, safety and welfare of workers and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine, and toxic or flammable gases; natural gas in pipelines greater than 150 mm in diameter or pipelines operating at pressures greater than 415 kPa (gage); underground electric supply system conductors or cables, with potential to ground of more than 300 V, either directly buried or in a duct or conduit which do not have concentric grounded or other effectively grounded metal shields or sheaths.

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities, except as provided herein for conduit to be placed under pavement, until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. Conduit to be installed under pavement in the vicinity of these facilities shall be placed by the trenching method in conformance with the provisions in "Conduit" of these special provisions. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications.

Excavation required to install electrical conduits and pull boxes within 1.2 m of areas with high risk utilities shall be performed by hand excavation without the use of power equipment except that power equipment may be used to cut and remove asphalt or Portland cement pavement.

The Contractor shall notify the Engineer and the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include, but are not limited to, the following:

| Notification Center | Telephone Number |
|---|---|
| Underground Service Alert-Northern California (USA) | 1-800-642-2444<br>1-800-227-2600 |
| Underground Service Alert-Southern California (USA) | 1-800-422-4133<br>1-800-227-2600 |

The utility facilities listed in the following table, which may interfere with Approach and Departure Slab conctruction, cannot be de-activated.

| Utility Facility | Location |
|---|---|
| Overhead Wires | Fourth Street |
| Overhead Wires | First Street |
| Overhead Wires | Alhambra Avenue |
| Overhead Wires | Fletcher Drive |
| Overhead Wires | Sonora Avenue |
| Overhead Wires | Allen Avenue |
| Overhead Wires | Alameda Avenue |

**10-1.10 DUST CONTROL**

Dust control shall conform to the provisions in Section 10, "Dust Control," of the Standard Specifications.

**10-1.11 MOBILIZATION**

Mobilization shall conform to the provisions in Section 11, "Mobilization," of the Standard Specifications.

**10-1.12 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES**

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Category 1 traffic control devices are defined as those devices that are small and lightweight (less than 45 kg), and have been in common use for many years. The devices shall be known to be crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 traffic control devices. Self-certification shall be provided by the manufacturer or Contractor and shall include the following: date, Federal Aid number (if applicable), expenditure authorization, district, county, route and kilometer post of project limits; company name of certifying vendor, street address, city, state and zip code; printed name, signature and title of certifying person; and an indication of which Category 1 traffic control devices will be used on the project. The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 traffic control devices are defined as those items that are small and lightweight (less than 45 kg), that are not expected to produce significant vehicular velocity change, but may otherwise be potentially hazardous. Category 2 traffic control devices include: barricades and portable sign supports.

Category 2 devices purchased on or after October 1, 2000 shall be on the Federal Highway Administration (FHWA) Acceptable Crashworthy Category 2 Hardware for Work Zones list. This list is maintained by FHWA and can be located at the following internet address: http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone. The Department maintains a secondary list at the following internet address: http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf.htm.

Category 2 devices that have not received FHWA acceptance, and were purchased before October 1, 2000 shall not be used. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable. After January 1, 2003, all Category 2 devices without a label shall not be used on the project.

If requested by the Engineer, the Contractor shall provide a written list of Category 2 devices to be used on the project at least 5 days prior to beginning any work using the devices. For each type of device, the list shall indicate the FHWA acceptance letter number and the name of the manufacturer.

Full compensation for providing self-certification for crashworthiness of Category 1 traffic control devices and for providing a list of Category 2 devices used on the project and labeling Category 2 devices as specified shall be considered as included in the prices paid for the various contract items of work requiring the use of the Category 1 or Category 2 traffic control devices and no additional compensation will be allowed therefor.

## 10-1.13 CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Sign substrates for stationary mounted construction area signs may be fabricated from fiberglass reinforced plastic. Type II retroreflective sheeting shall not be used on construction area sign panels. Type III, IV, VII, VIII, or IX retroreflective sheeting shall be used for stationary mounted construction area sign panels.

Attention is directed to "Construction Project Information Signs" of these special provisions regarding the number and type of construction project information signs to be furnished, erected, maintained, and removed and disposed of.

Repair to construction area sign panels will not be allowed, except when approved by the Engineer. Sign panels exhibiting a significant color difference between daytime and nighttime shall be immediately replaced at the Contractor's expenses.

The Contractor shall notify the appropriate regional notification center for operators of subsurface installations at least 2 working days, but not more than 14 calendar days, prior to commencing excavation for construction area sign posts. The regional notification centers include, but are not limited to, the following:

| Notification Center | Telephone Number |
|---|---|
| Underground Service Alert-Northern California (USA) | 1-800-642-2444<br>1-800-227-2600 |
| Underground Service Alert-Southern California (USA) | 1-800-422-4133 |

Excavations required to install construction area signs shall be performed by hand methods without the use of power equipment, except that power equipment may be used if it is determined there are no utility facilities in the area of the proposed post holes. The post hole diameter, if backfilled with portland cement concrete, shall be at least 100 mm greater than the major dimension of the post.

Construction area signs placed within 4.6 m from the edge of the travel way shall be mounted on stationary mounted sign supports as specified in "Construction Area Traffic Control Devices" of these special provisions.

The Contractor may be required to cover certain signs during the progress of the work. Signs that are no longer required or that convey inaccurate information to the public shall be immediately covered or removed, or the information shall be corrected. Covers for construction area signs shall be of sufficient size and density to completely block out the complete face of the signs. The retroreflective face of the covered signs shall not be visible either during the day or at night. Covers shall be fastened securely so that the signs remain covered during inclement weather. Covers shall be replaced when they no longer cover the signs properly.

## 10-1.14 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the provisions in "Public Safety", "Portable Changeable Message Sign", "Traffic Plastic Drums", "Replace Concrete Pavement (Rapid Strength Concrete)" and "Structure Approach Slabs (Type _R)" of these special provisions and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Lane closures shall conform to the provisions in "Traffic Control System for Lane Closure" of these special provisions.

In addition to the provisions set forth in "Public Safety" of these special provisions, whenever work to be performed on the freeway traveled way, except when

1. Sawcutting concrete slabs or installing loop detectors with a shadow vehicle equipped with a truck mounted attenuator (TMA)
2. Grinding/grooving operations, or
3. Installing, maintaining and removing traffic control devices

is within 1.8 m of the adjacent traffic lane, the adjacent traffic lane shall be closed.

Personal vehicles of the Contractor's employees shall not be parked within the freeway right of way.

The Contractor shall notify local authorities of the Contractor's intent to begin work at least 5 days before work is begun. The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the shoulder within 1.8 m of a traffic lane, the shoulder area shall be closed as shown on the plans.

Lanes shall be closed only during the hours shown on charts included in this section "Maintaining Traffic", except for work required under Sections 7-1.08 and 7-1.09 and for closure restrictions specified in Table Z, "Lane Closure Restrictions for Designated Legal Holidays and Special Days".

When performing traffic control for stationary lane closures where median shoulders are less than 2.4 meters, the Contractor shall conform to the requirements for truck-mounted attenuators (TMA) as specified in "Moving Lane Closure" of these special provisions and the Traffic Handling Details Plan.

When removing and replacing concrete pavement and approach slabs, the Contractor shall schedule operations in conformance with the hours and requirements as shown on Table A through Table V in place of Charts 1 through 10, Chart 25 and Chart 35. The Contractor shall place special "WET CONCRETE" signs (2100 mm x 900 mm, series "D" letters and black on orange) in front of newly poured concrete during the entire curing period. The Contractor shall not work at more than one location in either direction at a time .

Except as otherwise provided in these special provisions, Route 5 freeway may be closed to public traffic at one location in one direction at a time for loop detector installation in conformance with the hours and requirements as shown on Charts No. 11 through No. 16. At those locations where a full freeway closure chart is not provided, the Contractor shall close freeway lanes as shown on the Traffic Handling Details plan titled "Flip-Flop" Operation and in conformance with the hours shown in Charts 1 through 10.

Except as otherwise provided in these special provisions, ramps may be closed when the adjacent freeway lane is permitted to be closed as shown on Charts 1 through 10.

Closure of on-ramps or off-ramps servicing 2 consecutive local street interchanges in the same direction of travel will not be allowed. Deviations from ramp closure requirements shall be requested in writing by the Contractor and submitted to the Engineer for approval.

The Engineer may permit the deviations if public traffic will be better served and the work expedited. If 2 or more consecutive on-ramps are permitted to be closed, special signs for entrance ramp closures (SP-4) as shown on the plans shall be furnished and installed at the Contractor's expense. When an off-ramp is closed, the Contractor shall furnish and erect special signs for exit ramp closures (SP-3 or SP-5), as shown on the plans. This sign shall be placed on the right shoulder of freeway upstream of the preceding off-ramp.

Special advance notice publicity signs (SP-1), as shown on the plans, shall be posted at locations as determined by the Engineer, a minimum of 7 days prior to ramp or connector closures. When work is not actively in progress, SP-1 signs shall be removed or covered.

Full compensation for furnishing, erecting, maintaining, and removing special advance notice publicity signs (SP-1), special portable freeway detour signs (SP-2, SP-6 or SP-7), special signs for exit ramp closures (SP-3 or SP-5) and special "WET CONCRETE" signs as shown on the plans shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

Special signs shall be disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way" of the Standard Specifications at the conclusion of the project.

Work that encroaches onto the freeway or connector traveled ways and the following ramps

Northbound Route 5:

a. Riverside Dr. on-ramp
b. Stadium Way off-ramp
c. Fletcher Dr. on-ramp

Southbound Route 5

a. Fletcher Dr. off-ramp
b. Stadium Way off-ramp
c. Stadium Way on-ramp
d. Riverside Dr. on-ramp

shall not be allowed from 3 hours before to 2 hours following events at the venues, or special events listed below, unless otherwise permitted by the Engineer.

| Venue/Special Event | Affected Routes | Route Limits |
|---|---|---|
| Los Angeles Marathon | 5 | Route 710 to Route 10 (Northbound only) |
| Cinco De Mayo or any Parades or festivals in Downtown LA | 5 | Routes 5/10/60/101 to Broadway |
| Dodger Stadium | 5 | Route 10 to Route 134 |
| Griffith Park Light Show | 5 | Route 2 to Route 134 |
| The Love Ride | 5 | Route 2 to Lake Hughes Road (Northbound only) |

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, November 11th, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the preceding Friday shall be a designated legal holiday.

Special Days are Martin Luther King Day and Columbus Day.

**Table Z**

| **Lane Closure Restrictions for Designated Legal Holidays and Special Days** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Each row represents an individual legal holiday or special day situation | **Thu** | **Fri** | **Sat** | **Sun** | **Mon** | **Tues** | **Wed** | **Thu** | **Fri** | **Sat** | **Sun** |
| | X | **H** xx | xx | xx | | | | | | | |
| | | x | **H** xx | xx | | | | | | | |
| | | x | xx | **H** xx | xx | | | | | | |
| | | x | xx | Xx | **H** xx | | | | | | |
| | | x | | | **SD** xx | | | | | | |
| | | | | | x | **H** xx | | | | | |
| | | | | | | x | **H** xx | | | | |
| | | | | | | | x | **H** xx | xx | | Xx |

**H** = Designated Legal Holiday
**SD** = Special Day

| | |
|---|---|
| | Refer to lane requirements and hours of work charts |
| x | The full width of the traveled way shall be open for use by public traffic after 0500. |
| xx | The full width of the traveled way shall be open for use by public traffic. |

Deviations from the requirements of this section concerning hours of work shall be requested in writing by the Contractor and submitted to the Engineer for approval. The Engineer may permit the deviations if public traffic will be better served and the work expedited without significant change to the cost of the work.

**Chart No. 1**
**Freeway Lane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 27.20 to 29.29
Direction: Northbound Location: from Whittier Blvd. to Route 10 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 2 | 2 | 1 | 2 | 2 | 4 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | 4 | 4 |
| Fridays | 3 | 2 | 2 | 2 | 2 | 4 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | 4 | 4 |
| Saturdays | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | S | S | S | S | X | X | X | X | X | X | X | S | S | S | S |
| Sundays | 4 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 3 | 4 | S | S | S | X | X | X | X | X | X | X | S | S | 4 | 3 |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4* or 5
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 2**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 29.29 to 31.87
Direction: Northbound Location: from Route 10 off-connector to Route 110 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 2 | S | X | X | X | S | S | S | S | S | X | X | X | X | X | X | S | S | 3 | 2 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | S | X | X | X | S | S | S | S | X | X | X | X | X | X | X | X | S | S | 3 | |
| Saturdays | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | S | S | S | X | X | X | X | X | X | X | X | S | 4 | 4 | 3 | |
| Sundays | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | S | X | X | X | X | X | S | S | S | S | 4 | 4 | 3 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4* or 5
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 3**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 31.87 to 35.81
Direction: Northbound Location: from Route 110 off-connector to Route 2 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 2 | 1 | 1 | 1 | 2 | 4 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 4 | 4 | 3 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | 4 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 4 | 4 | 3 | |
| Saturdays | 2 | 2 | 2 | 1 | 1 | 2 | 4 | S | S | S | X | X | X | X | X | X | X | X | X | X | X | S | 4 | 3 | |
| Sundays | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | 3 | 4 | S | X | X | X | X | X | X | X | X | S | S | S | 4 | 3 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4* or 5
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 4**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 35.81 to 42.28
Direction: Northbound Location: from Route 2 off-connector to Route 134 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 2 | 3 | X | X | X | S | S | S | S | S | S | X | X | X | S | S | S | 3 | 3 | 2 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | 3 | X | X | X | S | S | S | S | S | S | X | X | X | X | S | S | S | S | 3 | |
| Saturdays | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 4 | S | S | S | S | S | S | S | S | 4 | 4 | 4 | 4 | 4 | 3 | |
| Sundays | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | S | S | S | S | S | S | S | 4 | 4 | 4 | 4 | 3 | 2 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4* or 5*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 5**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 42.28 to 46.35
Direction: Northbound Location: from Route 134 off-connector to Providencia Avenue

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 1 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | 2 | |
| Fridays | 2 | 1 | 1 | 1 | 1 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | 2 | |
| Saturdays | 2 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | S | X | X | X | X | X | X | X | X | X | X | X | X | S | 2 | 2 | |
| Sundays | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | S | S | X | X | X | X | X | X | X | X | X | S | S | 3 | 2 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 6**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 46.35 to 43.45
Direction: Southbound Location: from Providencia Avenue to Route 134 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 2 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | 3 | 3 | 2 | |
| Fridays | 1 | 1 | 1 | 1 | 2 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | 3 | 2 | |
| Saturdays | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | S | S | X | X | X | X | X | X | X | X | X | S | S | 3 | 3 | 3 | |
| Sundays | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | S | S | X | X | X | X | X | X | X | S | S | S | 3 | 3 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 7**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 43.45 to 36.85
Direction: Southbound Location: from 134 off-connector to Route 2 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 2 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | 3 | 3 | 2 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 4 | 3 | 3 | 3 | |
| Saturdays | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | S | S | X | X | X | X | X | X | X | S | S | 4 | 4 | 4 | 3 | |
| Sundays | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 4 | 4 | S | S | S | S | S | S | S | 4 | 4 | 4 | 3 | 2 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4* or 5*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 8**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From: 36.85 to 34.28
Direction: Southbound Location: from Route 2 off-connector to S/B Route 110 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 2 | 1 | 1 | 1 | 2 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | 3 | 2 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | |
| Saturdays | 2 | 2 | 2 | 1 | 1 | 2 | 3 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | |
| Sundays | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 3 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 2 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 3* or 4*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 9**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 34.29 to 30.26
Direction: Southbound Location: from S/B Route 110 off-connector to E/B Route 10 off-connector

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 1 | 1 | 1 | 1 | 2 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | 3 | 3 | 3 | 2 | |
| Fridays | 1 | 1 | 1 | 1 | 2 | 3 | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | 3 | 3 | 3 | |
| Saturdays | 2 | 2 | 1 | 1 | 1 | 2 | 3 | S | S | S | X | X | X | X | X | X | X | X | X | S | S | 3 | 3 | 3 | |
| Sundays | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | S | S | S | S | S | S | S | S | S | S | S | 3 | 3 | 2 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 3* or 4*
* - Traffic lanes outside of the through traffic lanes delineated with a double line of pavement markers as shown on "Pavement Markers and Traffic Lines Typical Details (Detail 37 series)," may be closed at the same time as through traffic lane or adjacent connector.

**Chart No. 10**
**FreewayLane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: From 30.26 to 27.20
Direction: Southbound Location: from E/B Route 10 off-connector to Whittier Blvd. UC

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | 2 | 1 | 1 | 1 | 2 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | S | 4 | 3 | |
| Fridays | 2 | 1 | 1 | 1 | 2 | S | X | X | X | X | X | X | X | X | X | X | X | X | X | S | S | S | S | 4 | |
| Saturdays | 3 | 2 | 2 | 1 | 2 | 2 | 4 | S | X | X | X | X | X | X | X | X | X | X | X | X | S | S | S | 4 | |
| Sundays | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 4 | 4 | S | X | X | X | X | X | X | X | X | X | X | X | S | 4 | 3 | |

Legend:

| | |
|---|---|
| 1 | Provide at least one through lane open in direction of travel |
| 2 | Provide at least two adjacent through lanes open in direction of travel |
| 3 | Provide at least three adjacent through lanes open in direction of travel |
| 4 | Provide at least four adjacent through lanes open in direction of travel |
| S | Shoulder closure permitted. |
| X | No work permitted |

REMARKS: Number of Through Traffic Lanes - 4 or 5

**Chart No. 11**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: 28.65
Direction: Northbound Location: First Street

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic to exit at 4th St. off-ramp; east on 4th St.; north on Soto St.; west on Marengo St. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of the northbound Route 5 freeway upstream of the closure with the message: "FREEWAY / CLOSED / AT 4TH ST". A minimum of 20 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

Close the eastbound Route 10 and westbound Route 60 to northbound Route 5 connector and detour traffic per the requirements in Charts 18 and 19.

**Chart No. 12**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: from 30.09 to 32.19
Direction: Northbound Location: from Marengo Street to Pasadena Avenue

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic to exit at Cesar Chavez Ave. off-ramp; east on Cesar Chavez Ave; north on Soto St.; west on Marengo St.; north on Daly St.; west on Broadway to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of the northbound Route 5 freeway upstream of the closure with the message: "FREEWAY / CLOSED / AT - CESAR / CHAVEZ". A minimum of 24 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
Close the westbound Route 10 to northbound Route 5 connector and detour traffic to exit at Soto St. off-ramp; south on Soto St.; west on Marengo St.; north on Daly St.; west on Broadway to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of the westbound Route 10 freeway upstream of the closure with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / USE / SOTO ST". A minimum of 24 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 13**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: from 36.61 to 37.34
Direction: Northbound Location: from Route 2 to Fletcher Drive

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic onto northbound Route 2 and exit at San Fernando Road off-ramp; north on San Fernando Rd.; west on Glendale Blvd. to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of the northbound Route 5 freeway upstream of Stadium Way off-ramp with the message: "FREEWAY / CLOSED / AHEAD – DETOUR / USE / NORTH 2". A minimum of 16 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

Close northbound Route 2 to northbound Route 5 connector and detour traffic per the requirements in Chart 38.

Close southbound Route 2 to northbound Route 5 connector and detour traffic to exit at Fletcher Dr. off-ramp, west on Fletcher Dr. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign upstream of the closure with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / USE / FLETCHER". A minimum of 8 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 14**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: from 37.01 to 36.05
Direction: Southbound Location: from Fletcher Dr. to Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic to exit at Fletcher Dr. off-ramp; west on Fletcher Dr; south on Riverside Dr to Stadium Way on-ramp to southbound Route 5 freeway. Place a portable changeable message sign upstream of the closure with the message: "FREEWAY / CLOSED / AT- FLETCHER / DR". A minimum of 10 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 15**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: from 34.94 to 33.31
Direction: Southbound Location: from Stadium Way to Duvall Street

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic to exit at Stadium Way off-ramp; north on Stadium Way; east on Riverside Dr. to the Duvall St. on-ramp to southbound Route 5 freeway. Place a portable changeable message sign upstream of the closure with the message: "FREEWAY / CLOSED / AHEAD – DETOUR / STADIUM / WAY". A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
Close northbound Route 2 to Route 5 connector and detour traffic per the requirements in Chart 38.
Close southbound Route 2 to Route 5 connectors and detour traffic per the requirements in Chart 39.

**Chart No. 16**
**Complete Freeway Closure Hours**

County: Los Angeles Route: 5 Kilo Post: 31.30
Direction: Southbound Location: Broadway Avenue

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Fridays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Saturdays | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| Sundays | N | N | N | C | C | C | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

Legend:

| | |
|---|---|
| C | Freeway or expressway may be closed completely |
| N | No complete freeway or expressway closure is permitted |

REMARKS:
Detour traffic onto the northbound Route 110 / Broadway collector road; continue on Ave. 21 to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign upstream of the closure with the message: "FREEWAY / CLOSED / AHEAD – DETOUR / USE/ BROADWAY". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. Close the slip on-ramp to southbound Route 5 freeway. Place a second portable changeable message sign in the maintenance area north of Avenue 43 off-ramp on southbound Route 110 freeway with the message: "SOUTH 5 / EXIT / CLOSED – DETOUR / USE / BROADWAY".

**Chart No. 17**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | 1 |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | |
| Saturdays | 1 | C | C | C | C | | | | | | | | | | | | | | | | | | | | |
| Sundays | | C | C | C | C | C | C | 1 | | | | | | | | | | | | | | | | | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| 1 | Provide at least one connector lane open in direction of travel. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR (Alternative 1)**

Detour traffic onto northbound Route 101 freeway; east on Route 10 freeway and exit at State St. off-ramp to the on-ramp to northbound Route 5 freeway. Close Calzona Street on-ramp. Place a portable changeable message sign at the Calzona Street on-ramp with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / N 101 TO / EAST 10". A minimum of 15 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The Contractor shall begin the closure at the median shoulder and provide a slip ramp to northbound Route 101.

**DETOUR (Alternative 2)**

Detour traffic onto westbound Route 10 freeway and exit at Santa Fe Ave. off-ramp; east on 8th St.; south on Santa Fe Ave.; west on Porter St. to the on-ramp to the eastbound Route 10 freeway collector road to northbound Route 5 freeway. Close Calzona Street on-ramp. Place a portable changeable message sign at the Calzona Street on-ramp with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / WEST 10 / SANTA FE". A minimum of 18 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 18**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 60
Direction: Westbound Route 60 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way. |

REMARKS:
Detour traffic to exit at Soto St. off-ramp; north on Soto St.; west on Marengo St. to the on-ramps to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 60 freeway in advance of the connector by Call Box #15 with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / USE / SOTO ST". A minimum of 22 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 19**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 10
Direction: Eastbound Route 10 to Northbound Route 5 / Eastbound Route 10

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | 1 | 1 | | | | | | | | | | | | | | 2 | 1 | 1 | |
| Fridays | C | C | C | C | C | C | 1 | 1 | | | | | | | | | | | | | | | 1 | 1 | |
| Saturdays | 1 | C | C | C | C | C | C | C | 1 | 2 | | | | | | | | | | | | 1 | 1 | 1 | |
| Sundays | 1 | 1 | C | C | C | C | C | C | 1 | 2 | 2 | | | | | | | | | | | 2 | 1 | 1 | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| 1 | Provide at least one connector lane open in direction of travel. |
| 2 | Provide at least twp connector lanes open in direction of travel. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to eastbound Route 60 freeway and exit at Lorena Street off-ramp; north on Lorena Street to the on-ramp to westbound Route 60. Place a portable changeable message sign inside the connector closure with the message: "NORTH 5 / EXIT / CLOSE – DETOUR / E 60 TO / LORENA". A minimum of 9 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
Close the Santa Fe Ave. collector road slip on-ramp when the connector is closed.

**Chart No. 20**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction:: Southbound Route 5 to Westbound Route 10

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | 2 | 1 | C | C | |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | 2 | 2 | C | |
| Saturdays | C | C | C | C | C | C | 2 | | | | | | | | | | | | | | 2 | 2 | 2 | 1 | |
| Sundays | C | C | C | C | C | C | C | 1 | 2 | 2 | | | | | | | | | | | | | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| 1 | Provide at least one connector lane open in direction of travel. |
| 2 | Provide at least twp connector lanes open in direction of travel. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic onto eastbound route 60 freeway and exit at Soto St. off-ramp; south on Soto St.; west on Olympic Blvd.; north on Santa Fe Ave.; west on 8th St. to the on-ramp to westbound Route 10 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the Cesar Chavez Avenue on-ramp gore with the message: WEST 10 / EXIT / CLOSED – DETOUR / E 60 EXIT/ SOTO ST". A minimum of 20 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

Close the 4th St. on-ramp as necessary.

**Chart No. 21**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Southbound Route 5 / Eastbound Route 60

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | |
| Saturdays | | C | C | C | C | C | | | | | | | | | | | | | | | | | | | |
| Sundays | | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR ( Alternative 1)**

Detour traffic onto eastbound Route 10 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at Main Street UC by Call Box #189 with the message: "RTE 5&60 / EXITS / CLOSED – DETOUR / EAST 10 TO / S 710.

**DETOUR ( Alternative 2)**

Detour traffic onto westbound Route 10 freeway and exit at Santa Fe Ave. off-ramp; east on 8th St.; south on Santa Fe Ave.; west on Porter St. to the collector road to eastbound Route 60 and southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the 4th Street on-ramp gore with the message: "RTE 5 & 60 / EXITS / CLOSED – USE / W 10 TO / SANTA FE". A minimum of 20 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 22**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Eastbound Route 10

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | |
| Saturdays | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | C |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR ( Alternative 1)**

Detour traffic to exit at Cesar Chavez Ave. off-ramp; east on Cesar Chavez Ave.; north on Soto St.; east on Marengo St. to the on-ramp to eastbound Route 10 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway in advance of the 4th St. off-ramp between Call Box #'s 166TC and 172 with the message: "EAST 10 / EXIT / CLOSED – USE / CESAR / CHAVEZ". A minimum of 22 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**DETOUR ( Alternative 2)**

Detour traffic to continue northbound on Route 5 freeway; exit at the Broadway off-ramp; west on Broadway to the on-ramp to southbound Route 5 freeway to eastbound Route 10. Place a portable changeable message sign on the right shoulder upstream of closure on northbound Route 5 freeway with the message: "EAST 10 / EXIT / CLOSED – USE / BROADWAY". A minimum of 20 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 23**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 10
Direction: Westbound Route 10 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | C | |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | C | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR ( Alternative 1)**

Detour traffic onto northbound Route 101 freeway and exit at Mission Rd. off-ramp; north on Mission Rd.; east on Marengo St. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 freeway in advance of the Soto St. off-ramp by Call Box # 205 with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / N101 TO / MISSION". A minimum of 13 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**DETOUR ( Alternative 2)**

Detour traffic to continue on northbound Route 101 and exit at Mission Rd. off-ramp; north on Mission Rd.; west on Daly St.; west on Broadway to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / MISSION / ROAD". A minimum of 22 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
Close State St. on-ramp.

**DETOUR ( Alternative 3)**

Detour traffic to continue on northbound Route 101 and exit at Mission Rd. off-ramp; north on Mission Rd.; east on Cesar E Chavez Ave. to Sunset Blvd., north on Glendale Blvd. to the on-ramp to northbound Route 2 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 freeway upstream of the Route 101 connector with the message: "NORTH 5 / EXIT / CLOSED – USE / MISSION / ROAD". A minimum of 32 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 24**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 10
Direction: Westbound Route 10 to Southbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | C | |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C | |
| Saturdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR (Alternative 1)**
Detour traffic onto northbound Route 5 freeway and exit at Broadway off-ramp; west on Broadway to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 freeway in advance of the Soto St. off-ramp by Call Box # 205 with the message: "SOUTH 5 / EXIT / CLOSED - DETOUR / NORTH 5 / BROADWAY". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure
Close Soto Street on-ramp.

**DETOUR (Alternative 2)**
Detour traffic onto northbound Route 101 freeway and exit at Mission Rd. off-ramp; south on Mission Rd. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 freeway in advance of the Soto St. off-ramp by Call Box # 205 with the message: "SOUTH 5 / EXIT / CLOSED - DETOUR / N101 TO / MISSION". A minimum of 10 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
Close Soto Street on-ramp.

**DETOUR (Alternative 3)**
Detour traffic to exit at Soto St. off-ramp; south on Soto St.; east on 8th St. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 10 at the Herbert St. on-ramp with the message: "SOUTH 5 / EXIT / CLOSED – DETOUR / EXIT / SOTO ST". A minimum of 18 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 25**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Eastbound Route 10

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | C | |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C | |
| Saturdays | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to continue on southbound Route 5 freeway and exit at 4th St. off-ramp; east on 4th St. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway in advance of the Mission Rd. off-ramp by Call Box # 189 with the message: "EAST 10 / EXIT / CLOSED - DETOUR / USE / 4TH ST". A minimum of 10 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 26**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Northbound Route 110

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | | | C | C | C | C | C |
| Fridays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | | | | C | C | C | C |
| Saturdays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | C | C | C | C |
| Sundays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | C | C | C | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
**Detour (Alternative 1)**
Detour traffic to exit at Broadway off-ramp and continue north to Pasadena Ave.; east to Avenue 26; north to the on-ramp to northbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway at Main Street off-ramp gore with the message: "N110 / EXIT / CLOSED - DETOUR / USE / BROADWAY". A minimum of 14 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Detour (Alternative 2)**
Detour traffic to exit at Broadway off-ramp and continue north to Pasadena Ave.; east on Figueroa St.; south on S Ave. 60 to the on-ramp to northbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway at Main Street off-ramp gore with the message: "N110 / EXIT / CLOSED - DETOUR / USE / BROADWAY". A minimum of 22 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 27**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Northbound Route 110

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**Detour (Alternative 1)**

Detour traffic to continue on southbound Route 110 connector; exit at Figueroa St. off-ramp; east on Riverside Drive; north on Figueroa Street; east on Avenue 26 to the on-ramp to northbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the on-connector gore from Route 2 by Call Box # 217 with the message: "N110 / EXIT / CLOSED – DETOUR / USE / FIGUEROA". A minimum of 15 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Detour (Alternative 2)**

Detour traffic to southbound Route 110 and exit at Stadium Way off-ramp; north on Stadium Way to the on-ramp to northbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the Route 2 on-connector with the message: "N 110 / EXIT / CLOSED – USE S 110 / STDIUM / WAY EXIT". A minimum of 15 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 28**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Southbound Route 110

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | C |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | C |
| Saturdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C |
| Sundays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | C | | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to continue on Northbound Route 110 connector and exit at Broadway off-ramp; west on Pasadena Ave.; west on N Broadway to the on-ramp to northbound Route 101 freeway; continue to the connector to southbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the on-connector gore from Route 2 by Call Box # 217 with the message: "S110 / EXIT / CLOSED - DETOUR / USE / BROADWAY". A minimum of 21 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 29**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 110 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | |
| Saturdays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**Detour (Alternative 1)**

Detour traffic to exit at Figueroa St. off-ramp; north on Figueroa Street; west on Avenue 26 to San Fernando Rd. to the on-ramp to southbound Route 2 freeway. Place a portable changeable message sign on the right shoulder northbound Route 110 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / FIGUEROA / ST ". A minimum of 16 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Detour (Alternative 2)**

Detour traffic to exit at Figueroa St. off-ramp; north on Figueroa Street; west on Avenue 26 to San Fernando Rd., south on Glendale Blvd. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder northbound Route 110 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / FIGUEROA / ST ". A minimum of 26 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 30**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 110
Direction: Southbound Route 110 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR (Alternative 1)**

Detour traffic to southbound Route 5 freeway and exit at Broadway off-ramp; east on Pasadena Ave. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign inside the connector closure with the message: "NORTH 5 / EXIT / CLOSED - USE / S5 TO / BROADWAY". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**DETOUR (Alternative 2)**

Detour traffic to exit at Avenue 26 off-ramp; west on Avenue 26; south on Figueroa Street; west on Riverside Dr. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign in pullout north of Avenue 43 off-ramp on southbound Route 110 freeway with the message: "NORTH 5 / EXIT / CLOSED - DETOUR / USE / AVE 26". A minimum of 15 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 31**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 110
Direction: Southbound Route 110 to Southbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | C | C | C | C | C | C | | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | | | | | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to northbound Route 5 freeway and exit at Stadium Way off-ramp; east on Riverside Drive, south on Stadium Way to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign inside the connector closure with the message: "SOUTH 5 / EXIT / CLOSED - USE N5 / STADIUM / WAY EXIT". A minimum of 11 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 32**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 110
Direction: Southbound Route 110 to Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to exit at Ave. 26 off-ramp; east on Ave 26; south Daly Street; west on Broadway to the on-ramps to Route 5 freeway. Place a portable changeable message sign inside the connector closure with the message: "ROUTE 5 / EXITS / CLOSED - DETOUR / USE / AVE 26". A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 33**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Northbound Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | C |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | |
| Saturdays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | |
| Sundays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to exit at Stadium Way off-ramp; north on Riverside Dr; east on Fletcher Dr. to the on-ramp to northbound Route 2 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway in advance of the Stadium Way off-ramp between Call Box #'s 214 and 216 with the message: "NORTH 2 / EXIT / CLOSED - USE / STADIUM / WAY". A minimum of 14 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure..

**Chart No. 34**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Southbound Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic onto northbound Route 2 freeway and exit at San Fernando Road off-ramp; west on San Fernando Road to the on-ramp to southbound Route 2 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway at the Stadium Way on-ramp gore with the message: "SOUTH 2 / EXIT / CLOSED - USE N2 / SAN / FERNANDO". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 35**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to exit at Fletcher Dr. off-ramp; for northbound Route 2 traffic - north on Fletcher Dr. to the on-ramp to northbound Route 2 freeway.; for southbound Route 2 traffic - south on Fletcher Dr.; south on Glendale Blvd. to the end of the freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway in advance of the Fletcher Dr. off-ramp by Call Box #235 with the message: "RTE 2 / EXITS / CLOSED - DETOUR / USE / FLETCHER". A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 36**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Northbound Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to exit at Fletcher Dr. off-ramp; north on Fletcher Dr. to the on-ramp to northbound Route 2 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway in advance of the Fletcher Dr. off-ramp by Call Box #235 with the message: "NORTH 2 / EXIT / CLOSED - DETOUR / USE / FLETCHER". A minimum of 7 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 37**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Southbound Route 2

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to exit at Fletcher Dr. off-ramp; south on Fletcher Dr.; south on Glendale Blvd. to the end of the freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway in advance of the Fletcher Dr. off-ramp by Call box #235 with the message: "SOUTH 2 / EXIT / CLOSED – DETOUR / USE / FLETCHER". A minimum of 15 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 38**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 2
Direction: Northbound Route 2 to Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | C | C | C | C | C | C | C | C | | | C | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to continue northbound on Route 2 freeway and exit at San Fernando Rd. off-ramp; west on San Fernando Road to the on-ramp to southbound Route 2 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 2 freeway in advance of the connector by Call Box #144 with the message: "RTE 5 / EXITS / CLOSED – USE SAN / FERNANDO / ROAD". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

When closing northbound Route 2 to southbound Route 5, detour traffic to exit at Riverside Ave. off-ramp, west on Newell St, south on Riverside Dr. to the Duvall St. on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 2 freeway in advance of the southbound Route 5 off-connector with the message: "SOUTH 5 / EXIT / CLOSED – USE / RIVERSIDE / DR". A minimum of 14 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 39**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 2
Direction: Southbound Route 2 to Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | C |
| Fridays | C | C | C | C | C | | | | | | | | | | | | | | | | | | | | |
| Saturdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | | |
| Sundays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | | C | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to exit at Fletcher Dr. off-ramp; south on Fletcher Dr. to the on-ramp to northbound Route 5 freeway. For southbound Route 5 traffic, east on Riverside Dr. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign at the San Fernando Road on-ramp gore with the message: "RTE 5 / EXITS / CLOSED – DETOUR / USE / FLETCHER". A minimum of 14 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. Place a special freeway detour sign (SP-7) at the northbound Route 5 freeway on-ramp to direct northbound Route 5 traffic.

**Chart No. 40**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 2
Direction: Southbound Route 2 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | C | C | C | C | C | C | C | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | C | C | C | C | C | C | C | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to exit at Fletcher Dr. off-ramp; south on Fletcher Dr. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign at the San Fernando Road on-ramp gore with the message: "NORTH 5 / EXIT / CLOSED - DETOUR / USE / FLETCHER". A minimum of 7 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 41**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Eastbound Route 134

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | C | C | C |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | C | C | C |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | | | | | | C | C | C | C | C | C | C | C | C |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to continue on northbound Route 5 freeway and exit at Western Ave. (west) off-ramp; west to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign inside the connector closure with the message: "EAST 134 / EXIT / CLOSED - DETOUR / USE / WESTERN". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 42**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Northbound Route 5 to Westbound Route 134

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | | | | | | | | | | | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:
Detour traffic to eastbound Route 134 freeway and exit at San Fernando Road off-ramp; west on Doran St. to San Fernando Road; north to Fairmont Ave.; east to the on-ramp to westbound Route 134 freeway. Place a portable changeable message sign on the right shoulder of northbound Route 5 freeway at Colorado St. on-ramp gore by Call Box # 258 with the message: "WEST 134 / EXIT / CLOSED - USE E 134 / TO SAN / FERNANDO". A minimum of 8 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 43**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 5
Direction: Southbound Route 5 to Eastbound Route 134

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | |
| Saturdays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to continue on southbound Route 5 freeway and exit at Colorado Street off-ramp; east to Edenhurst Ave. off-ramp; east on Colorado Blvd.; north on Edenhurst Ave. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign inside the connector closure with the message: "EAST 134 / EXIT / CLOSED - DETOUR / USE / COLORADO". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 44**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 134
Direction: Eastbound Route 134 to Southbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | | | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | | | | | C | |
| Saturdays | C | C | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | | | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to continue on eastbound Route 134 freeway and exit at San Fernando Road off-ramp; west on Doran St.; north on San Fernando Road; east on Fairmont Ave. to the on-ramp to westbound Route 134 freeway. Place a portable changeable message sign on the right shoulder of eastbound Route 134 freeway at Victory Blvd. off-ramp gore by Call Box # 44 with the message: "SOUTH 5 / EXIT / CLOSED - USE SAN / FERNANDO / ROAD". A minimum of 8 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 45**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 134
Direction: Westbound Route 134 to Northbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | | | | | | | | | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | | | | | | | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS: Detour traffic to exit at San Fernando Road off-ramp; west on Fairmont Ave.; north on San Fernando Road; west on Western Ave. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 134 freeway at Pacific Ave. on-ramp gore by Call Box # 67 with the message: "NORTH 5 / EXIT / CLOSED - DETOUR / SAN / FERNANDO". Close San Fernando Road on-ramp. A minimum of 19 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 46**
**Connector Lane Requirements and Hours of Work**

County: Los Angeles Route: 134
Direction: Westbound Route 134 to Southbound Route 5

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | | | | | | | | | | | | | | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | | | | | | | | | | | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Connector may be closed completely. |
| | No shoulder or lane closure permitted; work permitted within project right of way |

REMARKS:

**DETOUR (Alternative 1)**

Detour traffic to exit at San Fernando Road off-ramp; west on Fairmont Ave.; south on San Fernando Road; east on Colorado St. to the on-ramp to westbound Colorado St. freeway extension; west to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 134 freeway at Pacific Ave. on-ramp gore by Call Box # 67 with the message: "SOUTH 5 / EXIT / CLOSED - DETOUR / SAN / FERNANDO". A minimum of 21 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**DETOUR (Alternative 2)**

Detour traffic onto northbound Route 5 freeway and exit at Western Ave. (west) off-ramp; west on Western Ave. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 134 freeway between Pacific Ave. on-ramp and San Fernando Road off-ramp by Call Box # 67 with the message: "SOUTH 5 / EXIT / CLOSED - DETOUR / N5 TO / WESTERN". A minimum of 6 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.

**Chart No. 47**
**Complete Ramp Lane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: 35.18
Direction: Northbound Location: Stadium Way on ramp

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Ramp may be closed completely |
| S | Shoulder closure permitted. |

REMARKS: When the ramp is closed, public traffic shall be detoured to the next available on-ramp downstream of the closed ramp in the direction of travel. A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 48**
**Complete Ramp Lane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: 37.28
Direction: Northbound Location: Fletcher Drive on ramp

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Ramp may be closed completely |
| S | Shoulder closure permitted. |

REMARKS: When the ramp is closed, public traffic shall be detoured to the next available on-ramp downstream of the closed ramp in the direction of travel. A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure. The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 49**
**Complete Ramp Lane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: 45.58
Direction: Northbound Location: Alameda Avenue off ramp

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Ramp may be closed completely |
| S | Shoulder closure permitted. |

REMARKS:
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

**Chart No. 50**
**Complete Ramp Lane Requirements and Hours of Work**

County: Los Angeles Route: 5 Kilo Post: 29.83
Direction: Southbound Location: Mission Road on ramp

| FROM HOUR TO HOUR | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mondays through Thursdays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Fridays | C | C | C | C | C | C | S | S | S | C | C | C | C | C | C | S | S | S | S | C | C | C | C | C | |
| Saturdays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |
| Sundays | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | |

Legend:

| | |
|---|---|
| C | Ramp may be closed completely |
| S | Shoulder closure permitted. |

REMARKS: When the ramp is closed, public traffic shall be detoured to the next available on-ramp downstream of the closed ramp in the direction of travel. A minimum of 12 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.
The full width of the traveled way shall be open for use by public traffic when construction operations are not actively in progress.

TABLE A

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB REPLACEMENT

| LOCATION: N/B Route 5 and W/B Route 60 to N/B Route 5 connector | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 or<br>No. 1 & 2 or<br>No. 1, 2 & 3 | #1, 2 & 3 | 2200 Friday to 0800 Saturday<br>0100 Sunday to 1000 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 or<br>No. 1 & 2 or<br>No. 1, 2 & 3 | Close the northbound Route 5 to northbound Route 5 and westbound Route 60 to northbound Route 5 connectors and detour traffic per the requirements in Chart 17 and Chart 18.<br><br>Place a portable changeable message sign on the right shoulder of northbound Route 5 upstream of the northbound Route 710 connector with the message: "FREEWAY / CLOSED AT / SOTO ST – ALT / N 710 TO / WEST 10".<br><br>Place a 2nd portable changeable message sign on the right shoulder of westbound Route 60 upstream of the Route 710 connector with the message: "NORTH 5 / EXIT / CLOSED – ALT / N 710 TO / WEST 10".<br><br>Place a 3rd portable changeable message sign on the right shoulder of northbound Route 710 before Atlantic Blvd off-ramp with the message: "NORTH 5 / CLOSED AT / SOTO ST – ALT / N 710 TO / WEST 10".<br><br>Close the 7th St. on-ramp. | |

TABLE B

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB REPLACEMENT

<table>
<tr><td colspan="3">LOCATION: E/B Route 10 to N/B Route 5 connector</td></tr>
<tr><td rowspan="2">Slab/Lane Being Replaced</td><td rowspan="2">Lane No. Closed</td><td>Remove, Replace, and Cure Slabs</td></tr>
<tr><td>Closure Hours</td></tr>
<tr><td>No. 1</td><td>#1 & 2</td><td rowspan="3">2200 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday</td></tr>
<tr><td>No. 2 or<br>No. 1, 2 & 3</td><td>#1, 2 & 3</td></tr>
<tr><td>No. 3</td><td>#2 & 3</td></tr>
<tr><td>Slab/Lane Being Replaced</td><td colspan="2">Other Closure Requirements</td></tr>
<tr><td>No. 1</td><td colspan="2">Close the eastbound Route 10 to northbound Route 5 / Eastbound Route 10 connector and detour traffic per the requirements in Chart 19.<br><br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.</td></tr>
<tr><td>No. 2 or<br>No. 1, 2 & 3</td><td colspan="2">Close the eastbound Route 10 to northbound Route 5 / Eastbound Route 10 connector and detour traffic per the requirements in Chart 19.<br><br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.</td></tr>
<tr><td>No. 3</td><td colspan="2">Close the eastbound Route 10 to northbound Route 5 / Eastbound Route 10 connector and detour traffic per the requirements in Chart 19.<br><br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.</td></tr>
</table>

TABLE C

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from Whittier Blvd OC to E/B Route 10 off-connector | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, 2 & 3 | 2200 Friday to 0900 Saturday<br>2200 Saturday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, 3 & 4 | 0000 Saturday to 0900 Saturday<br>0100 Sunday to 1000 Sunday |
| No. 3 | #3, 4 & 5 | 2200 Saturday to 0800 Saturday<br>0100 Sunday to 1000 Sunday |
| No. 4 | #4 & 5 | 2200 Friday to 0900 Saturday<br>0000 Sunday to 0900 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign on northbound Route 5 fwy as shown on the District Traffic Handling Plan.<br><br>Close the eastbound Route 10 to northbound Route 5 / eastbound Route 10 connector. Place a portable changeable message sign inside the closure with the message: "N5 & E10 / EXIT / CLOSED – DETOUR / E 60 TO / N 710".<br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.<br><br>Place a 2nd portable changeable message sign on the right shoulder of eastbound Route 10 in advance of the northbound Route 110 connector with the message: "EAST 10 / EXIT / CLOSED – ALT / N 110 TO / EAST 10". | |
| No. 1 or<br>No. 1 & 2 | Open lane #4 by 0600 on Saturdays and Sundays.<br>Place a portable changeable message sign on northbound Route 5 fwy as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 freeway in advance of the northbound Route 710 connector with the message: "NORTH 5 / AT / 4TH ST – SINGLE / LANE / ONLY".<br><br>Close the eastbound Route 10 to northbound Route 5 / eastbound Route 10 connector. Place a portable changeable message sign inside the closure with the message: "N5 & E10 / EXIT / CLOSED – DETOUR / E 60 TO / N 710".<br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.<br><br>Place a 3rd portable changeable message sign on the right shoulder of eastbound Route 10 in advance of the northbound Route 110 connector with the message: "EAST 10 / EXIT / CLOSED – ALT / N 110 TO / EAST 10".<br><br>Place a 4th portable changeable message sign on the right shoulder of northbound Route 710 before Atlantic Blvd off-ramp with the message: "NORTH 5 / CLOSED AT / SOTO ST – ALT / N 710 TO / WEST 10".<br><br>Close the westbound Route 60 to northbound Route 5 connector, and detour traffic per the | |

| | |
|---|---|
| | requirements in Chart 18.<br>Close any on-ramps within the closure. |
| No. 3 | Place a portable changeable message sign on northbound Route 5 fwy as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the northbound Route 710 connector with the message: "FREEWAY / CLOSED AT / SOTO ST – ALT / N 710 TO / WEST 10".<br><br>Close the westbound Route 60 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 18.<br><br>Close the northbound Route 5 to northbound Route 5 connector and detour traffic per the requirements in Chart 17.<br><br>Close northbound Route 5 freeway to eastbound Route 10 connector when necessary, and detour traffic per the requirements in Chart 22. The Contractor shall provide a slip off ramp to Cesar Chavez off-ramp.<br><br>Close any ramps within the closure as necessary. |
| No. 4 | Open lane #4 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign on northbound Route 5 fwy as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the northbound Route 710 connector with the message: "FREEWAY / CLOSED AT / SOTO ST – ALT / N 710 TO / WEST 10".<br><br>Close the westbound Route 60 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 18.<br><br>Close the northbound Route 5 to northbound Route 5 connector, and detour traffic per the requirements in Chart 17.<br><br>Close northbound Route 5 freeway to eastbound Route 10 connector when necessary, and detour traffic per the requirements in Chart 22. The Contractor shall provide a slip off ramp to Cesar Chavez off-ramp.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE D

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB REPLACEMENT

| LOCATION: N/B Route 5 from E/B Route 10 off-connector to State St. on-ramp | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, 2 & 3 | 2300 Friday to 1000 Saturday<br>0100 Sunday to 1100 Sunday |
| No. 2 | #2, 3 & 4 | 2300 Friday to 0700 Saturday<br>0000 Sunday to 0900 Sunday |
| No. 3 | #3 & 4 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1100 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of eastbound Route 10 upstream of the Route 110 connector with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Place a 3rd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the Route 710 connector with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Place a 4th portable changeable message sign on the right shoulder of northbound Route 710 at Atlantic Blvd. off-ramp with the message: "NORTH 5 / SINGLE / LANE – ALT / N 710 TO / WEST 10".<br><br>Close any on-ramps within the closure.<br><br>Close the westbound Route 60 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 18. | |

| | |
|---|---|
| No. 2 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the eastbound Route 10 to northbound Route 5 / eastbound Route 10 connector. Place a portable changeable message sign inside the closure with the message: "N5 & E10 / EXIT / CLOSED – DETOUR / E 60 TO / N 710".<br>Close the Santa Fe Ave. collector road slip on-ramp to northbound Route 5.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the Route 710 connector with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Place a 3rd portable changeable message sign on the right shoulder of northbound Route 5 at Ditman Ave. with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Place a 4th portable changeable message sign inside the northbound Route 5 to northbound Route 5 connector before Soto St. off-ramp with the message: "SINGLE / LANE AT / 1ST ST – USE / SOTO & / 7TH ST". For 7th St., detour traffic to exit at 7th St. off-ramp; east on 7th St.; north on Boyle Ave.; east on Cesar Chavez Ave.; north on State St. to the northbound Route 5 freeway on-ramp. A minimum of 24 special freeway detour signs, as shown on plans, shall be posted along the detour route and shall be removed at the end of each closure.<br><br>Place a 5th portable changeable message sign on the right shoulder of northbound Route 710 at Atlantic Blvd. off-ramp with the message: "NORTH 5 / SINGLE / LANE – ALT / N 710 TO / WEST 10".<br><br>Close the westbound Route 60 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 18.<br><br>Close any ramps within the closure as necessary. |
| No. 3 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of eastbound Route 10 upstream of the Route 110 connector with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Place a 3rd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the Route 710 connector with the message: "SINGLE / LANE / ONLY – NORTH 5 / AT 4TH ST".<br><br>Provide a slip ramp to eastbound Route 10 connector as shown on the plan.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE E

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from State Street on-ramp to Broadway off-ramp | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, 2 & 3 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, 3 & 4 | 2300 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 3 | #3, 4 & 5 | 2100 Friday to 0800 Saturday<br>2100 Saturday to 1100 Sunday |
| No. 4 | #4 & 5 | |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #3 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #4 by 0500 on Saturdays and 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close any on-ramps within the closure.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 at Ditman Ave. with the message: "NORTH 5 / SINGLE / LANE – AT/ BROADWAY".<br><br>Place a 3rd portable changeable message sign on the right shoulder of westbound Route 60 at Downey Rd. with the message: "NORTH 5 / SINGLE / LANE – AT/ BROADWAY".<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 23. | |
| No. 3 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 23.<br><br>Close any ramps within the closure as necessary. | |
| No. 4 | Open lane #4 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 23.<br><br>Close any ramps within the closure as necessary. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE F

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from Broadway off-ramp to N/B Route 110 on-connector | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs |
| | | Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0000 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3 & 4 | |
| No. 4 | #3 & 4 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1000 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 3 in Chart 23.<br><br>Place a 2nd portable changeable message sign on the right shoulder of westbound Route 10 before Mission Rd. exit with the message: "AUTOS / USE – NORTH 110 / TO / NORTH 5".<br><br>Close any on-ramps within the closure. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 3 in Chart 23.<br><br>Place a 2nd portable changeable message sign on the right shoulder of westbound Route 10 before Mission Rd. exit with the message: "AUTOS / USE – NORTH 110 / TO / NORTH 5".<br><br>Close northbound Route 5 to northbound Route 110 connector as necessary, and detour traffic per the requirements in Chart 26.<br><br>Close southbound Route 110 to northbound Route 5 connector as necessary, and detour traffic per the requirements of Alternative 2 in Chart 30.<br><br>Close any ramps within the closure as necessary. | |
| No. 4 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br><br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br>Close northbound Route 5 to northbound Route 110 connector as necessary, and detour traffic per the requirements in Chart 26. | |

| | |
|---|---|
| | Close southbound Route 110 to northbound Route 5 connector as necessary, and detour traffic per the requirements of Alternative 2 in Chart 30.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE G

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from N/B Route 110 on-connector to N/B Route 2 off-connector | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0900 Saturday<br>0000 Sunday to 1100 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 1100 Sunday |
| No. 3 or<br>No. 3 & 4 | # 2, 3, 4 & 5 | 0000 Sunday to 1000 Sunday |
| No. 5 | #4 & 5 | 2100 Friday to 1100 Saturday<br>2100 Saturday to 1100 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0600 on Saturdays and 0900 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br><br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 29. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 3 in Chart 23.<br><br>Place a 2nd portable changeable message sign on the right shoulder of westbound Route 10 before Mission Rd. exit with the message: "AUTOS / USE – NORTH 110 / TO / NORTH 5".<br><br>Close the northbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 29.<br><br>Close the southbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 30.<br><br>Close the Pasadena Ave. and Riverside Dr. on-ramps to northbound Route 5 freeway.<br>Close any ramps within the closure as necessary. | |
| No. 5 | Open lane #4 by 0600 on Saturdays and 0900 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements in Chart 29.<br>Close any ramps within the closure as necessary. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE H

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from N/B Route 2 off-connector to Glendale Blvd on-ramp | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2300 Friday to 0900 Saturday<br>2300 Saturday to 1100 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0000 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3, 4 & 5 | |
| No. 4 or<br>No. 4 &5 | #3, 4 & 5 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1100 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound and southbound Route 2 to northbound Route 5 connectors, and detour traffic to exit at San Fernando Road off-ramp; north on San Fernando Road; west on Los Feliz Blvd. to the on-ramp to northbound Route 5 freeway. Place portable changeable message signs on the right shoulder of eastbound and westbound Route 2 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – USE SAN / FERNANDO / ROAD". A minimum of 12 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the northbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 29.<br>Close Riverside Dr. on-ramp.<br>Close any on-ramps within the closure. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound and southbound Route 2 to northbound Route 5 connectors, and detour traffic to exit at San Fernando Road off-ramp; north on San Fernando Road; west on Los Feliz Blvd. to the on-ramp to northbound Route 5 freeway. Place portable changeable message signs on the right shoulder of eastbound and westbound Route 2 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – USE SAN / FERNANDO / ROAD". A minimum of 12 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the northbound Route 110 freeway to northbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 29.<br><br>Close Riverside Dr. and Fletcher Dr. on-ramps. | |
| No. 4 or | Open lane #3 by 0600 on Saturdays and 0800 on Sundays. | |

| | |
|---|---|
| No. 4 &5 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound and southbound Route 2 to northbound Route 5 connectors, and detour traffic to exit at San Fernando Road off-ramp; north on San Fernando Road; west on Los Feliz Blvd. to the on-ramp to northbound Route 5 freeway. Place portable changeable message signs on the right shoulder of eastbound and westbound Route 2 freeway upstream of the connector with the message: "NORTH 5 / EXIT / CLOSED – USE SAN / FERNANDO / ROAD". A minimum of 12 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close Fletcher Dr. on-ramp. |

TABLE I

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT

| LOCATION: N/B Route 5 from Sonora Avenue Under Crossing to Providencia Avenue Overhead | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2300 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0100 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3 & 4 | |
| No. 4 | #3 & 4 | 2300 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday |
| Slab /Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0400 on Saturdays and by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the westbound Route 134 off-connector with the message: " SINGLE / LANE AT / WESTERN –ALT / WEST 134 / TO N 170". | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 134 to northbound Route 5 connector, and detour traffic to exit at San Fernando Road off-ramp; west on Fairmont Ave.; north on San Fernando Road; west on E Olive Ave.; north on Bonnywood Pl. to the on-ramp to northbound Route 5 freeway. Place a portable changeable message sign on the right shoulder of westbound Route 134 freeway at Pacific Ave. on-ramp gore by Call Box # 67 with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / SAN / FERNANDO". Close San Fernando Road on-ramp. A minimum of 23 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the westbound Route 134 off-connector with the message: " SINGLE / LANE AT / WESTERN –ALT / WEST 134 / TO N 170".<br><br>Close the Western Ave. on-ramps.<br><br>Close any on-ramps within the closure. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 134 to northbound Route 5 connector, and detour traffic to exit at San Fernando Road off-ramp; west on Fairmont Ave.; north on San Fernando Road; west on E Olive Ave.; north on Bonnywood Pl. to the on-ramp to northbound Route 5 freeway. Place | |

| | |
|---|---|
| | a portable changeable message sign on the right shoulder of westbound Route 134 freeway at Pacific Ave. on-ramp gore by Call Box # 67 with the message: "NORTH 5 / EXIT / CLOSED – DETOUR / SAN / FERNANDO". Close San Fernando Road on-ramp. A minimum of 23 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the westbound Route 134 off-connector with the message: " SINGLE / LANE AT / WESTERN –ALT / WEST 134 / TO N 170".<br><br>Close the Western Ave. on-ramps. |
| No. 4 | Open lane #3 by 0400 on Saturdays and by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of northbound Route 5 upstream of the westbound Route 134 off-connector with the message: " SINGLE / LANE AT / WESTERN –ALT / WEST 134 / TO N 170".<br><br>Close any ramps within the closure as necessary. |

TABLE J

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from Providencia Avenue Overhead to Sonora Avenue Under Crossing | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2300 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0100 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3 & 4 | |
| No. 4 | #3 & 4 | 2300 Friday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |

| Slab /Lane Being Replaced | Other Closure Requirements |
|---|---|
| No. 1 | Open lane #2 by 0400 on Saturdays and by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy upstream of the Route 170 connector with the message : "SINGLE / LANE / ONLY – S 5 AT / BURBANK / BLVD"<br><br>Close any on-ramps within the closure. |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy upstream of the Route 170 connector with the message : "SINGLE / LANE / ONLY – S 5 AT / BURBANK / BLVD"<br><br>Close any ramps within the closure as necessary. |
| No. 4 | Open lane #3 by 0500 on Saturdays and by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE K

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB REPLACEMENT

| LOCATION: S/B Route 5 from Glendale Blvd. off-ramp to Glendale Blvd on-ramp | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2100 Friday to 0900 Saturday<br>2100 Saturday to 1000 Sunday |
| No. 2 | #1, 2, & 3 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 0900 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3, 4 & 5 | 0000 Saturday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 4 | #3, 4 & 5 | 2300 Friday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 2 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ GLENDALE/ BLVD" | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0500 on Saturdays and 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ GLENDALE/ BLVD"<br><br>Close the eastbound Route 134 to southbound Route 5 connector, and detour traffic to continue on eastbound Route 134 to southbound Route 2 to southbound Route 5. Place a portable changeable message sign on the right shoulder of eastbound Route 134 freeway upstream of southbound Route 5 connector with the message: " SOUTH 5 / EXIT / CLOSED - USE / E 134 TO / SOUTH 2".<br><br>Close Los Feliz Blvd. and Glendale Blvd. on-ramps to southbound Route 5 freeway. | |
| No. 4 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br><br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ GLENDALE / BLVD"<br><br>Close any ramps within the closure as necessary. | |

TABLE L

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from Glendale Blvd. on-ramp to Stadium Way off-ramp | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0900 Saturday<br>2200 Saturday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3, 4 & 5 | 0000 Sunday to 1000 Sunday |
| No. 4 or<br>No. 4 & 5 | #3, 4 & 5 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1000 Sunday |
| Slab/Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave off-ramps and on-ramps with the message : "3 LEFT / LANES / CLOSED – S 5 AT/ GLENDALE / BLVD" | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave off-ramps and on-ramps with the message : "SINGLE / LANE / AHEAD – S 5 AT/ GLENDALE / BLVD"<br><br>Close southbound Route 5 to Route 2 connectors as necessary and detour traffic per the requirements in Chart 35.<br><br>Close Los Feliz Blvd. and Glendale Blvd. on-ramps to southbound Route 5 freeway. | |
| No. 4 or<br>No. 4 & 5 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave off-ramps and on-ramps with the message : "3 RIGHT / LANES / CLOSED – S 5 AT/ GLENDALE / BLVD"<br><br>Close southbound Route 5 to Route 2 connectors as necessary and detour traffic per the requirements in Chart 35.<br>Close any ramps within the closure as necessary. | |

TABLE M

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from Stadium Way off-ramp to Route 2 on-connectors | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0000 Saturday to 1000 Saturday<br>0100 Sunday to 1100 Sunday |
| No. 3 | #2, & 3 | 2200 Friday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |
| Slab /Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0500 on Saturdays and 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ FLETCHER / DR"<br><br>Place a 3rd portable changeable message sign on eastbound Route 134 upstream of the southbound Route 5 connector with the message: "S 5 AT / FLETCHER/ DR – SINGLE / LANE / ONLY".<br><br>Place a 4th portable changeable message sign on westbound Route 134 upstream of southbound Route 5 connector with the message: "S 5 AT / FLETCHER / DR – SINGLE / LANE / ONLY".<br><br>Close any on-ramps within the closure. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 2 to southbound Route 5 connector, and detour traffic per the requirements in Chart 39.<br><br>Place a 2nd portable changeable message sign on southbound Route 5 freeway at the gore area of Glendale Blvd on-ramp with the message: "SINGLE / LANE / AHEAD – EXIT / STADIUM / WAY."<br><br>Place a 3rd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ FLETCHER / DR"<br><br>Place a 4th portable changeable message sign on eastbound Route 134 upstream of the | |

| | |
|---|---|
| | southbound Route 5 connector with the message: "S 5 AT / FLETCHER/ DR – SINGLE / LANE / ONLY".<br>Place a 5th portable changeable message sign on westbound Route 134 upstream of southbound Route 5 connector with the message: "S 5 AT / FLETCHER / DR – SINGLE / LANE / ONLY".<br><br>Close Los Feliz Blvd. and Glendale Blvd. on-ramps. |
| No. 3 | Open lane #2 by 0500 on Saturdays and 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 fwy between the Western Ave. off-ramps and on-ramps with the message : "SINGLE / LANE / ONLY – S 5 AT/ FLETCHER / DR"<br><br>Place a 3rd portable changeable message sign on eastbound Route 134 upstream of the southbound Route 5 connector with the message: "S 5 AT / FLETCHER/ DR – SINGLE / LANE / ONLY".<br><br>Place a 4th portable changeable message sign on westbound Route 134 upstream of southbound Route 5 connector with the message: "S 5 AT / FLETCHER / DR – SINGLE / LANE / ONLY".<br><br>Close Los Feliz Blvd. and Glendale Blvd. on-ramps to southbound route 5 freeway. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE N

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from Route 2 on-connectors to S/B Route 110 off-connector | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 2300 Friday to 0900 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | # 2, 3, 4 & 5 | 0100 Sunday to 1000 Sunday |
| No. 4 or<br>No. 4 & 5 | #3, 4 & 5 | 2200 Friday to 0900 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 5 | #4 & 5 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 1000 Sunday |
| Slab /Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0700 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 2 to southbound Route 5 connector, and detour traffic per the requirements in Chart 39.<br><br>Close Glendale Blvd. and Stadium Way on-ramps to southbound Route 5 freeway. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 2 to southbound Route 5 connector, and detour traffic per the requirements in Chart 39.<br><br>Close the southbound Route 5 to southbound Route 110 connector as necessary and detour traffic to continue onto the southbound Route 110 connector and exit at Figueroa Street off-ramp; east on Riverside Drive; north on Figueroa Street to the on-ramp to southbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the on-connector gore from Route 2 by Call Box # 217 with the message: "S110 / EXIT / CLOSED – DETOUR / USE / FIGUEROA". A minimum of 10 special freeway detour signs shall be posted along the detour route as shown on the plan and as | |

| | |
|---|---|
| | directed by the Engineer.<br><br>Close Glendale Blvd. and Stadium Way on-ramps to southbound route 5 freeway. |
| No. 4 or<br>No. 4 & 5 | Open lane #3 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 2 to southbound Route 5 connector, and detour traffic per the requirements in Chart 39.<br><br>Close the southbound Route 5 to southbound Route 110 connector as necessary and detour traffic to continue onto the southbound Route 110 connector and exit at Figueroa Street off-ramp; east on Riverside Drive; north on Figueroa Street to the on-ramp to southbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the on-connector gore from Route 2 by Call Box # 217 with the message: "S110 / EXIT / CLOSED – DETOUR / USE / FIGUEROA". A minimum of 10 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close Glendale Blvd. and Stadium Way on-ramps to southbound route 5 freeway. |
| No. 5 | Open lane #4 by 0700 on Saturdays and 0800 on Sundays.<br><br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 5 to southbound Route 110 connector as necessary and detour traffic to continue onto the southbound Route 110 connector and exit at Figueroa Street off-ramp; east on Riverside Drive; north on Figueroa Street to the on-ramp to southbound Route 110 freeway. Place a portable changeable message sign on the right shoulder of southbound Route 5 freeway at the on-connector gore from Route 2 by Call Box # 217 with the message: "S110 / EXIT / CLOSED – DETOUR / USE / FIGUEROA". A minimum of 10 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 2 to southbound Route 5 connector, and detour traffic per the requirements in Chart 39.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE O

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from S/B Route 110 off-connector to S/B 110 on-connector | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2300 Friday to 0900 Saturday<br>2300 Saturday to 1100 Sunday |
| No. 1 & 2 | #1, 2, & 3 | 0100 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3 & 4 | 0000 Sunday to 1100 Sunday |
| No. 4 | #3 & 4 | |
| Slab /Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0500 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 2 to southbound Route 5 connector and detour traffic per the requirements in Chart 39.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close the Stadium Way on-ramp. | |

| | |
|---|---|
| No. 1 & 2 | Open lane #3 by 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close southbound Route 5 and detour traffic onto the northbound Route 110 and Broadway off-ramp distributor road back to southbound Route 5 freeway. Place a portable changeable message sign at the gore area of Stadium Way off-ramp with the message: "FREEWAY / CLOSED / AHEAD – DETOUR / N 110 TO / BROADWAY".<br><br>Close the southbound Route 2 to southbound Route 5 connector and detour traffic per the requirements in Chart 39.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 110 to southbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 31.<br><br>Close any on-ramps within the closure. |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0600 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 2 to southbound Route 5 connector and detour traffic per the requirements in Chart 39.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close southbound Route 5 to northbound Route 110 connector as necessary, and detour traffic per the requirements in Chart 27. Close Duvall St. on-ramp.<br><br>Close any on-ramps within the closure as necessary.<br><br>Close Los Feliz Blvd. Glendale Blvd. and Stadium Way on-ramps. |
| No. 4 | Open lane #3 by 0500 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 2 to southbound Route 5 connector and detour traffic per the requirements in Chart 39.<br><br>Close the northbound Route 2 to southbound Route 5 connector and detour traffic per the requirements of Alternative 2 in Chart 38.<br><br>Close Stadium Way on-ramp. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE P

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from S/B Route 110 on-connector to E/B Route 10 off-connector | | |
|---|---|---|
| Slab /Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, & 2 | 2200 Friday to 0800 Saturday<br>2300 Saturday to 1100 Sunday |
| No. 1 or<br>No. 1 & 2 | #1, 2, & 3 | 0000 Sunday to 1000 Sunday |
| No. 3 or<br>No. 3 & 4 | #2, 3 & 4 | |
| No. 4 | #3 & 4 | 2100 Friday to 0700 Saturday<br>2200 Saturday to 0900 Sunday |
| Slab /Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #2 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or<br>No. 1 & 2 | Open lane #3 by 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 110 / Broadway off-ramp slip on-ramp to southbound Route 5 freeway and detour traffic to Broadway off-ramp; east on Broadway; south on Daly Street; west on Mission Rd. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign in the maintenance area north of Avenue 43 off-ramp on southbound Route 110 freeway with the message: "SOUTH 5 / EXIT / CLOSED – DETOUR / USE / BROADWAY". Close the slip ramp from southbound Route 110 to southbound Route 5 connector. A minimum of 20 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close any on-ramps within the closure. | |
| No. 3 or<br>No. 3 & 4 | Open lane #2 by 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 110 / Broadway off-ramp slip on-ramp to southbound Route 5 freeway and detour traffic to Broadway off-ramp; east on Broadway; south on Daly Street; west on Mission Rd. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign in the maintenance area north of Avenue 43 off-ramp on southbound Route 110 freeway with the message: "SOUTH 5 / EXIT / CLOSED – DETOUR / USE / BROADWAY". Close the slip ramp from southbound Route 110 to southbound Route 5 connector. A minimum of 20 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the southbound Route 5 to eastbound Route 10 connector as necessary, and detour traffic to exit at Mission Road off-ramp; continue on the collect road to the on-ramp to eastbound Route 10 freeway. Place a portable changeable message sign at the gore area of Broadway on-ramp with the message: "EAST 10 / EXIT / CLOSED – DETOUR / MISSION / | |

| | |
|---|---|
| | ROAD". A minimum of 6 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the Broadway on-ramp. |
| No. 4 | Open lane #3 by 0600 on Saturdays and 0800 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 110 / Broadway off-ramp slip on-ramp to southbound Route 5 freeway and detour traffic to Broadway off-ramp; east on Broadway; south on Daly Street; west on Mission Rd. to the on-ramp to southbound Route 5 freeway. Place a portable changeable message sign in the maintenance area north of Avenue 43 off-ramp on southbound Route 110 freeway with the message: "SOUTH 5 / EXIT / CLOSED – DETOUR / USE / BROADWAY". Close the slip ramp from southbound Route 110 to southbound Route 5 connector. A minimum of 20 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close the southbound Route 5 to eastbound Route 10 connector as necessary, and detour traffic to exit at Mission Road off-ramp; continue on the collect road to the on-ramp to eastbound Route 10 freeway. Place a portable changeable message sign at the gore area of Broadway on-ramp with the message: "EAST 10 / EXIT / CLOSED – DETOUR / MISSION / ROAD". A minimum of 6 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Close any ramps within the closure as necessary. |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE Q

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 to E/B Route 10 off-connector | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs |
| | | Closure Hours |
| No. 1 & 2 | #1 & 2 | 0000 Sunday to 0900 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 & 2 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 5 to eastbound Route 10 connector and detour traffic per the requirements in Chart 25. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE R

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from E/B Route 10 off-connector to W/B Route 10 on-connector | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, 2 & 3 | 0000 Sunday to 1000 Sunday |
| No. 2 | #2, 3 & 4 | 0000 Sunday to 0900 Sunday |
| No. 3 | #3 & 4 | 2200 Friday to 0800 Saturday<br>2100 Saturday to 1000 Sunday |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #3 by 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close any on-ramps within the closure. | |
| No. 2 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>The Contractor shall provide a slip ramp to eastbound route 10 off-connector.<br><br>Close Broadway and Mission Rd. on ramps. | |
| No. 3 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>The Contractor shall provide a slip ramp to eastbound route 10 off-connector.<br><br>Close any ramps within the closure as necessary. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab.

TABLE S

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB AND APPROACH SLAB REPLACEMENT

| LOCATION: S/B Route 5 from W/B Route 10 on-connector to Whittier Blvd. Overcrossing | | |
|---|---|---|
| Slab Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1, 2 & 3 | 2300 Friday to 0800 Saturday<br>2300 Saturday to 1000 Sunday |
| No. 1 or No. 1 & 2 | #1, 2, 3 & 4 | 2300 Friday to 0800 Saturday<br>0000 Sunday to 1000 Sunday |
| No. 3 | #3, 4 & 5 | 2200 Friday to 0800 Saturday<br>2200 Saturday to 1000 Sunday |
| No. 4 | #4 & 5 | |
| Slab Being Replaced | Other Closure Requirements | |
| No. 1 | Open lane #3 by 0500 on Saturdays and 0700 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan. | |
| No. 1 or No. 1 & 2 | Open lane #4 by 0500 on Saturdays and 0600 on Sundays.<br>Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to southbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 24.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 freeway by the Broadway off-ramp with the message: "SINGLE / LANE / AT 4TH ST – ALT / E 10 / TO S 710".<br><br>Close any on-ramps within the closure. | |
| No. 3 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to southbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 24.<br><br>Close Cesar Chavez and 4th St. on-ramps. | |
| No. 4 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the westbound Route 10 freeway to southbound Route 5 connector, and detour traffic per the requirements of Alternative 2 in Chart 24.<br><br>Close any ramps within the closure as necessary. | |

TABLE T

PERMISSIBLE HOURS OF LANE CLOSURES FOR
CONCRETE SLAB REPLACEMENT

| LOCATION: S/B Route 5 to S/B Route 5 & E/B Route 60 connector | | |
|---|---|---|
| Slab/Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 or No. 1 & 2 | #1, 2 & 3 | 0100 Sunday to 0900 Sunday |
| Slab/Lane Being Replaced | Other Closure Requirements | |
| No. 1 or No. 1 & 2 | Place a portable changeable message sign as shown on the District Traffic Handling Plan.<br><br>Close the southbound Route 5 to southbound Roue 5 and eastbound Route 60 connectors and continue traffic to westbound Route 10 freeway and exit at the Santa Fe Ave. off-ramp; east on 8th St; south on Santa Fe Ave.; west on Porter St. to the on-ramp to southbound Route 5 and Eastbound Route 60 freeway. Place a portable changeable message sign inside the closure between the first and second advisory arrow with the message: "S5 & E 60 / EXITS / CLOSED – DETOUR / W 10 TO / SANTA FE". A minimum of 10 special freeway detour signs shall be posted along the detour route as shown on the plan and as directed by the Engineer.<br><br>Place a 2nd portable changeable message sign on the right shoulder of southbound Route 5 freeway upstream of the Mission Road off-ramp with the message: "S5 & E60 / EXITS / CLOSED – USE / EAST 10 / TO S 710".<br><br>Place a 3rd portable changeable message sign on the right shoulder of westbound Route 10 freeway inside the distributor collector road with the message: "SOUTH 5 / 3 LT LNS / CLOSED – USE / NORTH 101 / TO S 110". | |

TABLE U

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT

| LOCATION: Avenue 26 Undercrossing | | |
|---|---|---|
| Slab/Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs<br>Closure Hours |
| No. 1 | #1 & 2 | 2100 Friday to 0900 Saturday<br>2100 Saturday to 0900 Sunday |
| No. 2 or<br>No. 2 & 3 | #1, 2 & 3 | 2100 Friday to 0900 Saturday<br>2100 Saturday to 0900 Sunday |
| Slab/Lane Being Replaced | Other Closure Requirements | |
| No. 1 | Close the southbound Route 5 freeway to northbound Route 110 connector, and detour traffic per the requirements of Alternative 1 in Chart 27.<br><br>Provide one lane of traffic from northbound Route 5 to northbound Route 110 connector. | |
| No. 2 or<br>No. 2 & 3 | Close the northbound Route 5 freeway to northbound Route 110 connector, and detour traffic per the requirements of Alternative 1 in Chart 26.<br><br>Close the southbound Route 5 freeway to northbound Route 110 connector, and detour traffic per the requirements of Alternative 2 in Chart 27. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab

TABLE V

PERMISSIBLE HOURS OF LANE CLOSURES FOR
APPROACH SLAB REPLACEMENT

| LOCATION: Arroyo Seco Channel (on ramp) | | |
|---|---|---|
| Slab/Lane Being Replaced | Lane No. Closed | Remove, Replace, and Cure Slabs |
| | | Closure Hours |
| No. 1 & 2 | #1 & 2 | 2100 Friday to 0900 Saturday<br>2100 Saturday to 0900 Sunday |
| Slab/Lane Being Replaced | Other Closure Requirements | |
| No. 1 or No. 1 & 2 | Close the northbound Route 5 freeway to northbound Route 110 connector, and detour traffic per the requirements of Alternative 2 in Chart 26.<br><br>Close the southbound Route 5 freeway to northbound Route 110 connector, and detour traffic per the requirements of Alternative 2 in Chart 27. | |

Note: Median or outside shoulder slabs may be reconstructed concurrently with the adjacent freeway slab

## 10-1.15 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

### CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use the Closure Schedule request forms furnished by the Engineer. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing by noon at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall notify the Engineer of canceled closures 2 working days prior to the date on which closures were to be made. Closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer .

### CONTINGENCY PLAN

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer within one working day of the Engineer's request.

### LATE REOPENING OF CLOSURES

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 10-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct $5200 per interval from moneys due or that may become due the Contractor under the contract.

### COMPENSATION

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.
B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

## 10-1.16 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications, the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

During traffic stripe operations and pavement marker placement operations using bituminous adhesive, traffic shall be controlled, at the option of the Contractor, with either stationary or moving lane closures. During other operations, traffic shall be controlled with stationary lane closures. Attention is directed to the provisions in Section 84-1.04, "Protection From Damage," and Section 85-1.06, "Placement," of the Standard Specifications.

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

**STATIONARY LANE CLOSURE**

When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

The 500 m section of a lane closure, shown along lane lines between the 300 m lane closure tapers on the plans entitled "Traffic Control System for Lane Closures on Freeways and Expressways" and "Traffic Control System for Lane and Complete Closures on Freeways and Expressways" shall not be used.

**MOVING LANE CLOSURE**

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 2.1 m above the ground, but should be as high as practicable.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601–2076, Telephone (312) 467–6750.

   1. Distributor (northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone (800) 884–8274, FAX (916) 387–9734.
   2. Distributor (southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone (800) 222–8274.

B. Cal T–001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (925) 551–4900.

C. Renco Rengard Model Nos. CAM 8–815 and RAM 8–815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660–0730, Telephone (800) 654–8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 13 mm high letters which states, "The bottom of this TMA shall be _____ mm ± _____ mm above the ground at all points for proper impact performance." Any TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge as to whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMA in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

**PAYMENT**

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor, materials (including signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

## 10-1.17 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual on Uniform Traffic Control Devices (MUTCD), MUTCD California Supplement, or as relieving the Contractor from his responsibility as provided in Section 7-1.09, "Public Safety," of the Standard Specifications.

**GENERAL**

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways), edgeline delineation shall be provided at all times for traveled ways open to public traffic.

Work necessary, including required lines or marks, to establish the alignment of temporary pavement delineation shall be performed by the Contractor. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers and removable traffic tape which conflicts with a new traffic pattern or which is applied to the final layer of surfacing or existing pavement to remain in place shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

**TEMPORARY LANELINE DELINEATION**

Whenever lanelines are obliterated, the minimum laneline delineation to be provided shall be temporary raised pavement markers placed at longitudinal intervals of not more than 7.3 m. The temporary raised pavement markers shall be the same color as the laneline the markers replace. Temporary raised pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

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

Temporary laneline delineation consisting entirely of temporary raised pavement markers placed on longitudinal intervals of not more than 7.3 m shall be used on lanes open to public traffic for a maximum of 14 days. Prior to the end of the 14 days, the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, additional temporary pavement delineation shall be provided at the Contractor's expense. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Full compensation for furnishing, placing, maintaining, and removing the temporary raised pavement markers used for temporary laneline delineation and for providing equivalent patterns of permanent traffic lines for these areas when required shall be considered as included in the contract prices paid for the items of work that obliterated the laneline pavement delineation and no separate payment will be made therefor.

**TEMPORARY EDGELINE DELINEATION**

Whenever edgelines are obliterated on multilane roadways (freeways and expressways), the edgeline delineation to be provided for that area adjacent to lanes open to public traffic shall consist of traffic stripe of the same color as the stripe the temporary edgeline delineation replaces.

Traffic stripe placed for temporary edgeline delineation shall conform to Section 84-3, "Painted Traffic Stripes And Pavement Markings," of the Standard Specifications, except for payment and the number of coats shall be, at the option of the Contractor, either one or 2 coats.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

Full compensation for furnishing, placing, maintaining, and removing temporary edgeline delineation shall be considered as included in the contract prices paid for the items of work that obliterated the edgeline pavement delineation and no separate payment will be made therefor.

## 10-1.18 BARRICADE

Barricades shall be furnished, placed and maintained at the locations shown on the plans or where designated by the Engineer. Barricades shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Prequalified and Tested Signing and Delineation Materials" of these special provisions regarding retroreflective sheeting for barricades.

Construction area sign and marker panels conforming to the provisions in Section 12-3.06, "Construction Area Signs," of the Standard Specifications shall be installed on barricades in a manner determined by the Engineer at the locations shown on the plans.

Sign panels for construction area signs and marker panels installed on barricades shall conform to the provisions in Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications.

Barricades shown on the plans as part of a traffic control system will be paid for as provided in "Traffic Control System for Lane Closure" of these special provisions and will not be included in the count for payment of barricades.

## 10-1.19 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations shown on the plans or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions. Messages displayed on portable changeable message signs shall be as specified in these special provisions, as shown on the plans, or as directed by the Engineer.

Attention is directed to Charts 11 through 46 and Tables A through V in "Maintaining Traffic" of these special provisions regarding the use and locations of the portable changeable message signs.

Messages displayed on portable changeable message signs, as specified in these special provisions, as shown on the plans or as directed by the Engineer, shall not be displayed until 5 minutes prior to lane closure installation as permitted by these special provisions. Portable changeable message signs shall have 24 hour timer control or remote control capability.

A Contractor's representative with a cellular phone shall be on the job site for operations which require portable changeable message signs. The representative shall modify messages as determined by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing, placing, operating, maintaining, repairing, replacing, transporting from location to location, modifying the message, and removing portable changeable message signs as specified in these special provisions as shown on the plan shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

## 10-1.20 TRAFFIC PLASTIC DRUMS

Traffic plastic drums shall conform to the requirements for traffic control devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Traffic plastic drums shall be constructed of low-density polyethylene and shall be flexible or collapsible upon impact by vehicles. Traffic plastic drums shall have weighted bases that will separate from drums. Bases shall be of such shape to preclude rolling upon impact by vehicles and sufficient mass to maintain drums in position and upright. Bases or external ballast rings shall not exceed 100 mm in height and drum rings shall not exceed 970 mm maximum in diameter. Bases or external rings placed over and around drums, resting on pavement or ground shall contain ballast for drums. Ballast shall be sand or water, escept sand shall be used in areas susceptible to freezing. Sand bags shall not be used as ballast.

Bodies of traffic plastic drums shall be fluorescent orange or predominately orange color. Drums shall be a minimum of 915 mm in height above the traveled way and have a 460 mm minimum width, regardless of orientation.

Markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective bands 100 to 150 mm wide. Drums shall have a minimum of 2 orange and 2 white bands. The top of the uppermost retroreflective band shall be no lower than 150 mm from the tops of drums. Non-reflective spaces between bands shall not exceed 50 mm in width. Retroreflective sheeting shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" ofthese special provisions.

Only one type of traffic plastic drum shall be used on the project. Traffic plastic drums proposed fur use shall be submitted to the Engineer for approval and shall not be place until approved.

In curvilinear alignments, traffic plastic drums shall be used only on one side of the traveled way. Traffic plastic drums shall be placed on the alignment and location shown on the plans, or as directed by the Engineer. Traffic plastic drums shall be placed uniformly, straight on tangent alignments and on a true arc on curved alignment. Layout work necessary to place traffic plastic drums to the proper alignment shall be performed by the Contractor.

If traffic plastic drums are displaced or are not in an upright position, from any cause, traffic plastic drums shall immediately be replaced or restored to their original location, in an upright position, by the Contractor.

At the completion of the project, traffic plastic drums shall become the property of the Contractor and removed from the site of the work.

Full compensation for furnishing, placing, maintaining and removing plastic traffic drums as shown on the plans shall be considered as included in the contract lump sum price paid for traffic control system and no separate payment will be made therefor.

## 10-1.21 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 4.6 m or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or TrafFix Sand Barrels manufactured after March 31, 1997, or equal:

A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755

   1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
   2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070

B. TrafFix Sand Barrels, manufactured by TrafFix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205

1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
2. Distributor (South): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in kilograms for each module shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at the Contractor's expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at the Contractor's expense.

Temporary crash cushion modules shall be placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type R or P marker panel shall be attached to the front of the crash cushion as shown on the plans, when the closest point of the crash cushion array is within 3.6 m of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules placed in conformance with the provisions in "Public Safety" of these special provisions will not be measured nor paid for.

## 10-1.22 EXISTING HIGHWAY FACILITIES

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

Except as otherwise provided for damaged materials in Section 15-2.04, "Salvage," of the Standard Specifications, the materials to be salvaged shall remain the property of the State, and shall be cleaned, packaged, bundled, tagged, and hauled to the District Recycle Center at 609 Heliotrope, Los Angeles, CA 90004 and stockpiled.

The Contractor shall notify the Engineer and the District Recycle Coordinator, telephone (213) 897-0828 a minimum of 48 hours prior to hauling salvaged material to the Recycle Center.

Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. Work practices and worker health and safety shall conform to the California Division of Occupational Safety and Health Construction Safety Orders Title 8, of the California Code of Regulations including Section 5158, "Other Confined Space Operations."

### REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies, terminal sections, or steel foundation tubes shall be considered as included in the contract price paid per meter for remove metal beam guard railing and no separate payment will be made therefor.

### REMOVE PAVEMENT MARKER

Existing pavement markers, including underlying adhesive, when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

Full compensation for removing and disposing of pavement markers and underlying adhesive shall be considered as included in the contract price paid per cubic meter for replace concrete pavement (Rapid Strength Concrete) and no separate payment will be made therefor.

**REMOVE ASPHALT CONCRETE DIKE**

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

Prior to removing the dike, the outside edge of the asphalt concrete to remain in place shall be cut on a neat line to a minimum depth of 50 mm.

The dike shall be removed in such a manner that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

**COLD PLANE ASPHALT CONCRETE PAVEMENT**

Existing asphalt concrete pavement shall be cold planed at the locations and to the dimensions shown on the plans.

Planing asphalt concrete pavement shall be performed by the cold planing method. Planing of the asphalt concrete pavement shall not be done by the heater planing method.

Cold planing machines shall be equipped with a cutter head not less than 750 mm in width and shall be operated so that no fumes or smoke will be produced. The cold planing machine shall plane the pavement without requiring the use of a heating device to soften the pavement during or prior to the planing operation.

The depth, width, and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 45 mm will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical: Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Operations shall be scheduled so that not more than 2 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of cold planed material shall be concurrent with planing operations and follow within 15 m of the planer, unless otherwise directed by the Engineer.

Cold plane asphalt concrete pavement will be measured by the square meter. The quantity to be paid for will be the actual area of surface cold planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square meter for cold plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cold planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions and as directed by the Engineer.

**EXISTING LOOP DETECTORS**

The existing inductive loop detectors shall remain in place unless otherwise noted.

If part of the loop conductor, including the portion leading to the adjacent pull box, is damaged by the Contractor's operations, the entire detector loop shall be replaced at the Contractor's expense. Adjacent loops damaged during the replacement shall also be replaced.

## 10-1.23 ASPHALT CONCRETE

Asphalt concrete shall be Type B and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

The amount of asphalt binder used in asphalt concrete placed in dikes shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.

Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.

Paint binder (tack coat) shall be, at the option of the Contractor, either slow-setting asphaltic emulsion, rapid-setting asphaltic emulsion or paving asphalt. Slow-setting asphaltic emulsion and rapid-setting asphaltic emulsion shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder, the grade will be determined by the Engineer. Paving asphalt shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 92, "Asphalts," of the Standard Specifications.

Paint binder (tack coat) shall be applied in the liter per square meter range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

| Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP) | | |
|---|---|---|
| Type of surface to receive paint binder (tack coat) | Slow-Setting Asphaltic Emulsion $L/m^2$(Note A) | Rapid-Setting Asphaltic Emulsion $L/m^2$(Note B) |
| Dense, compact surfaces, between layers, and on PCCP | 0.20 – 0.35 | 0.10 – 0.20 |
| Open textured, or dry, aged surfaces | 0.35 – 0.90 | 0.20 – 0.40 |

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.

Note B: Undiluted rapid-setting asphaltic emulsion.

| Application Rates for Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP) | |
|---|---|
| Type of surface to receive paint binder (tack coat) | Paving Asphalt $L/m^2$ |
| Dense, compact surfaces, between layers, and on PCCP | 0.05 – 0.10 |
| Open textured, or dry, aged surfaces | 0.10 – 0.25 |

When asphaltic emulsion is used as paint binder (tack coat), asphalt concrete shall not be placed until the applied asphaltic emulsion has completely changed color from brown to black.

The miscellaneous areas to be paid for at the contract price per square meter for place asphalt concrete (miscellaneous area), in addition to the prices paid for the materials involved, shall be limited to the areas listed on the plans.

Aggregate for asphalt concrete dikes shall be in conformance with the provisions for 9.5-mm Maximum grading in Section 39-2.02, "Aggregate," of the Standard Specifications.

If the Contractor selects the batch mixing method, asphalt concrete shall be produced by the automatic batch mixing method in conformance with the provisions in Section 39-3.03A(2), "Automatic Proportioning," of the Standard Specifications.

## 10-1.24 REPLACE CONCRETE PAVEMENT (RAPID STRENGTH CONCRETE)

Replace concrete pavement (Rapid Strength Concrete) shall consist of removing existing portland cement concrete pavement and underlying cement treated base and constructing rapid strength concrete (RSC) pavement as shown on the plans and in conformance with Section 40, "Portland Cement Concrete Pavement," of the Standard Specifications and these special provisions.

Attention is directed to "Public Safety," "Order of Work," and "Closure Requirements and Conditions" of these special provisions.

**DEFINITIONS**

The following definitions shall apply to this section:

A. EARLY AGE. – A time less than 10 times the final set time of the concrete.
B. FINAL SET TIME. – The elapsed time after initial contact of cement and water, or accelerator, if used, at which a specific penetration resistance of 27.6 MPa is achieved in conformance with the requirements in ASTM Designation: C 403.
C. OPENING AGE. – The age at which the concrete will achieve the specified strength for opening to public or Contractor traffic.

**PRE-OPERATION CONFERENCE**

The Contractor and subcontractors involved in construction operations of RSC shall meet with the Engineer at a pre-operation conference, at a mutually agreed time, to discuss methods of accomplishing all phases of the construction operation, contingency planning, and standards of workmanship for the completed item of work.

The Contractor shall provide the facility for the pre-operation conference. The Contractor's superintendent, foremen, subcontractors, field staff, quality control manager, plant personnel including plant supervisors, manager, and operator involved with RSC shall attend the pre-operation conference. The Contractor shall submit a list of participants to the Engineer for approval. The complete listing shall identify each participant's name, employer, title and role in construction of RSC. The pre-operation conference shall be held for no less than 2 hours. Construction operations of RSC shall not begin until the specified personnel have completed the mandatory pre-operation conference.

**JUST-IN-TIME TRAINING**

Just-In-Time Training (JITT) shall be mandatory, and consist of a formal joint training class on rapid strength concrete and paving techniques. Construction operations for rapid strength concrete shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel included in the list of participants for the Pre-Operation Conference along with the Engineer's representatives shall attend JITT.

The JITT session will be conducted for not less than 4 hours on rapid strength concrete and paving techniques. The training class may be an extension of the Pre-Operation Conference and shall be conducted at the project field location convenient for both the Contractor's and the Engineer's project staffs. Scheduling and completion of the JITT session shall be completed at least 15 working days prior to the start of construction of rapid strength concrete. The class shall be held during normal working hours.

The JITT instructor shall be experienced in the construction methods, materials, and test methods associated with rapid strength concrete and paving techniques. The instructor shall not be an employee of the Contractor or a member of the Engineer's field staff. A copy of the syllabus, handouts, and presentation material shall be submitted to the Engineer at least 7 days before the day of the training. Selection of the course instructor, the course content and training site shall be as mutually agreed to by the Contractor and the Engineer. The instructor shall issue a certificate of completion to the participants upon the completion of the class. The certificate shall include the course title, date and location of the class, the name of the participant, instructor's name, location and phone number.

The Contractor's or Engineer's personnel involved with rapid strength concrete operations will not be required to attend JITT if they have completed similar training within the previous 12 months of the date of the JITT for this project. The Contractor shall provide a certificate of class completion as described above for each staff member to be excluded from the JITT session. The final determination for exclusion of any staff member's participation will be as determined by the Engineer. All attendees of the JITT shall complete, and submit to the Engineer, an evaluation of the training. The course evaluation form will be provided by the Engineer.

It is expressly understood that Just-In-Time Training shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformity with the requirements of the plans and specifications.

**REMOVING EXISTING PAVEMENT AND BASE MATERIALS**

Exact limits of concrete pavement to be replaced will be determined by the Engineer.

Existing concrete pavement and underlying base material shall be removed and replaced with base material and RSC pavement within the same work period. In the event existing pavement or base materials are removed and the Contractor is unable to construct, finish, and cure RSC pavement prior to the specified traffic opening time, a temporary roadway structural section shall be constructed.

The outline of concrete pavement and underlying base material to be removed shall be sawed full depth with a power-driven saw except where the pavement is located adjacent to an asphalt concrete shoulder. Saw cuts within concrete

pavement slabs shall be cut no more than 2 days prior to concrete pavement slab removal. Saw cuts made in work shifts prior to the actual removal work shift shall not be made parallel or diagonal to the traveled way and shall be cut so that traffic will not dislodge any pieces or segments.

Tie bars are located at longitudinal joints and shall be sawn through prior to concrete pavement slab removal.

Concrete pavement shall be removed by non-impacting methods. Each pavement panel shall be removed in one or more pieces without disturbance or damage to the underlying base.

Equipment used to remove concrete pavement within the sawed outline, shall not impact the surface of the concrete to be removed within 0.5-m of pavement to remain in place. Pavement and base removal shall be performed without damage to pavement or base to remain in place. Damage to pavement or base to remain in place, shall be repaired or removed and replaced. Repair, or removal and replacement of the damaged pavement and base shall be at the Contractor's expense and will not be measured nor paid for.

Removed materials shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The material remaining in place, after removing pavement and base to the required depth, shall be graded to a uniform plane, moisture conditioned, and compacted by methods that will produce a firm and stable base. The finished surface of the remaining material shall not extend above the grade established by the Engineer. Areas that are low as a result of over excavation during base removal shall be filled, at the Contractor's expense, with base replacement material at the time and in the same operation that the base replacement layer is placed.

## TEMPORARY ROADWAY STRUCTURAL SECTION

Asphalt concrete and aggregate base, equal to the quantity of pavement removed during the work shift, shall be provided on site for construction of a temporary roadway structural section where existing pavement is to be replaced. The quantity and location of standby material shall be included in the Contractor's contingency plan in conformance with the requirements of these special provisions. Temporary roadway structural section shall be maintained and later removed as the first order of work when replace concrete pavement (Rapid Strength Concrete) operations resume. The temporary roadway structural section shall consist of 90-mm thick asphalt concrete over aggregate base. RSC not conforming to these special provisions for RSC may be used for temporary roadway structural section with the Engineer's approval.

Aggregate base for temporary roadway structural section shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel, natural rough-surfaced gravel, reclaimed concrete and sand, or any combination thereof. Grading of aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Asphalt concrete for temporary roadway structural section shall be produced from commercial quality aggregates and asphalt binder. Grading of aggregate shall conform to the 19-mm maximum, medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and asphalt binder shall conform to requirements for liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. Amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3 percent less than the optimum bitumen content determined, by the Contractor, in conformance with the requirements in California Test 367.

Aggregate base and asphalt concrete for the temporary roadway structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, with a surface of uniform smoothness, texture and density. Surfaces shall be free from pockets of coarse or fine material. Aggregate base may be spread and compacted in one layer. Asphalt concrete may be spread and compacted in one layer. Finished surface of asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m ±0.06 m long straightedge placed parallel with the centerline and shall match the elevation of existing concrete pavement along the joints between the existing pavement and temporary surfacing.

Removed temporary roadway structural section materials shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, except that removed aggregate base may be stockpiled at the project site and reused for construction of temporary roadway structural sections. When no longer required, standby material or stockpiled material for construction of temporary roadway structural sections shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

## RAPID STRENGTH CONCRETE

### General

Rapid Strength Concrete (RSC) shall be a concrete made with hydraulic cement that develops opening age and 7-day specified modulus of rupture strengths.

Requirements of Sections 40-1.015, "Cement Content," 40-1.05, "Proportioning," 90-1.01, "Description," and 90-4.08, "Required Use of Mineral Admixtures," of the Standard Specifications shall not apply.

Combined aggregate grading used in RSC shall be either the 37.5-mm, maximum grading, or 25-mm, maximum grading, at the option of the Contractor.

Cement for RSC shall be hydraulic cement as defined in ASTM Designation: C 219 and shall conform to the following requirements:

| Test Description | Test Method | Requirement |
|---|---|---|
| Contraction in Air | California Test 527,W/C Ratio = 0.39 ± 0.010 | 0.053 %, max. |
| Mortar Expansion in Water | ASTM Designation: C 1038 | 0.04 %, max. |
| Soluble Chloride* | California Test 422 | 0.05 %, max. |
| Soluble Sulfates* | California Test 417 | 0.30 %, max. |
| Thermal Stability | California Test 553 | 60 %, min. |
| Compressive Strength @ 3 days | ASTM Designation: C 109 | 17 MPa |

*Test is to be done on a cube specimen, fabricated in conformance with the requirements in ASTM Designation: C 109, cured at least 14 days and then pulverized to 100% passing the 300-µm sieve

At least 45 days prior to intended use, the Contractor shall furnish a sample of cement from each lot proposed for use and all admixtures proposed for use in the quantities ordered by the Engineer.

The Contractor shall submit uniformity reports for cement used in RSC to the Engineer. Uniformity reports shall conform to the requirements in ASTM Designation: C 917, except that testing age and water content may be modified to suit the particular material. Uniformity reports shall be submitted at least every 30 days during RSC pavement operations.

Type C accelerating chemical admixtures conforming to the provisions in Section 90-4, "Admixtures," of the Standard Specifications may be used. In addition to the admixtures listed on the Department's current list of approved admixtures, citric acid or borax may be used if requested in writing by the cement manufacturer and a sample is submitted to the Engineer. Chemical admixtures, if used, shall be included in the testing for requirements listed in the table above.

At least 15 days prior to use in the trial slab, the Contractor shall submit a mix design for RSC that shall include the following:

A. Opening age
B. Proposed aggregate gradings
C. Mix proportions of hydraulic cement and aggregate
D. Types and amounts of chemical admixtures
E. Maximum time allowed between batching RSC and placing roadway pavement
F. Range of ambient temperatures over which the mix design is effective (10˚C maximum range)
G. Final set time of the concrete
H. Any special instructions or conditions, including but not limited to, water temperature requirements when appropriate

The Contractor shall submit more than one mix design to plan for ambient temperature variations anticipated during placement of the roadway pavement. Each mix shall be designed for a maximum ambient temperature range of 10°C. The Contractor shall develop and furnish modulus of rupture development data for each proposed mix design. Modulus of rupture development data for up to 7 days shall be provided to the Engineer prior to beginning paving operations. Modulus of rupture development data may be developed from laboratory prepared samples. The testing ages for modulus of rupture development data shall include one hour before opening age, opening age, one hour after opening age, 24 hours, 7 days and 28 days.

Concrete pavement penetration requirements in Section 90-6.06, "Amount of Water and Penetration," of the Standard Specifications shall not apply to RSC.

RSC pavement shall develop a minimum modulus of rupture of as specified in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions before opening to public or Contractor traffic. In addition, RSC pavement shall develop a minimum modulus of rupture of 4.2 MPa in 7 days after placement. RSC pavement that attains a modulus of rupture of less than specified may be accepted in conformance with "Pay Factor Adjustment for Low Modulus of Rupture" specified herein. Modulus of rupture shall be determined by averaging results from 3 beam specimens tested in conformance with the requirements in California Test 523. Beam specimens may be fabricated using an internal vibrator in conformance with the requirements in ASTM Designation: C 31. No single test shall represent more than the production of that day or 100 cubic meters, whichever is less.

Modulus of rupture at early age may be estimated using the correlation established during trial slab placement or by using results from beam specimens cured under atmospheric conditions and at a temperature within 3°C of the pavement. Modulus of rupture at other ages will be determined using beams cured and tested in conformance with California Test 523 except beams will be placed into sand between 5 and 10 times final set time or 24 hours, whichever is earlier. The Engineer will perform the testing to determine modulus of rupture values of the RSC pavement. The modulus of rupture, as determined above, will be the basis for accepting or rejecting the RSC pavement for modulus of rupture requirements.

**Pay Factor Adjustment for Low Modulus of Rupture**

Payment for replace concrete pavement (Rapid Strength Concrete) will be adjusted for low modulus of rupture tests as follows:

A. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.8 MPa or greater before the lane is opened to the traffic and 7-day modulus of rupture of 4.2 MPa or greater will be paid for at the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete).
B. Replace concrete pavement (Rapid Strength Concrete) with a 7-day modulus of rupture of less than 3.4 MPa will not be paid for, and shall be removed and replaced, at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.
C. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of 2.4 MPa or greater before the lane is opened to traffic and a 7-day modulus of rupture of equal to or greater than 3.4 MPa will be paid for at a percentage of the contract price per cubic meter for replace concrete pavement (Rapid Strength Concrete) in conformance with the percentages in the pay table below.
D. Replace concrete pavement (Rapid Strength Concrete) with modulus of rupture of less than 2.4 MPa when the lane is opened to traffic will be rejected and shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

Percentage Pay Table

| Modulus of Rupture (MPa) at opening to traffic | 7-Day Modulus of Rupture (MPa) | | |
|---|---|---|---|
| | Greater than or equal to 4.2 | Less than 4.2 and greater than or equal to 3.8 | Less than 3.8 and greater than or equal to 3.4 |
| Greater than or equal to 2.8 | 100% | 95% | 90% |
| Less than 2.8 and greater than or equal to 2.4 | 95% | 95% | 90% |
| Less than 2.4 | 0%* | 0%* | 0%* |

*Any replacement panels that develops cracks within 120 days after placement shall be removed and replaced at the Contractor's expense with replace concrete pavement (Rapid Strength Concrete) conforming to the requirements of these special provisions.

The Contractor shall pay to the State adjustments in payment for low modulus of rupture tests in conformance with the requirements specified in the tables in this section. The Department will deduct the amount of the adjustments from moneys due or that may become due, the Contractor under the contract.

**Proportioning**

Weighing, measuring and metering devices used for proportioning materials shall conform to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications and these special provisions.

Over and under dials, and other indicators for weighing and measuring systems used in proportioning materials shall be grouped so that the smallest increment for each indicator can be accurately read from the point at which the proportioning operation is controlled for ingredients batched at a central batch plant. In addition, indicators for weighing and measuring cement batched from a remote weighing system shall also be placed so that each indicator can be accurately read from the point at which the proportioning operation is controlled

Aggregates shall be handled and stored in conformance with the provisions in Section 90-5.01, "Storage of Aggregates," of the Standard Specifications. Liquid admixtures shall be proportioned in conformance with the provisions in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures," of the Standard Specifications. Mineral admixtures shall be protected from exposure to moisture until used. Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures to easily track the materials that are entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.

Weighing equipment shall be insulated against vibration or movement of other operating equipment. When the plant is in operation, the mass of each draft of material shall not vary from the designated mass by more than the tolerances specified herein. Each scale graduation shall be 0.001 of the usable scale capacity.

Aggregate shall be weighed cumulatively and equipment for the weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch mass of the aggregate. Equipment for the separate weighing of the cement or mineral admixture shall have a zero tolerance of ±0.5 percent of their designated individual batch drafts. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated mass or volume.

The mass indicated for any individual batch of material shall not vary from the preselected scale setting by more than the following:

| Material | Tolerance |
|---|---|
| Aggregate | ± 1.0 percent of designated batch mass |
| Cement | ± 0.5 percent of designated batch mass |
| Mineral Admixture | ± 1.0 percent of designated batch mass |
| Water | ± 1.5 percent of designated batch mass or volume |

Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture and water as provided in these special provisions. Dry ingredients shall be proportioned by mass. Liquid ingredients shall be proportioned by mass or volume.

At the time of batching, aggregates shall have been dried or drained sufficiently to result in stable moisture content, so that no visible separation of water from aggregate will take place during the proportioning process. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry mass.

If separate supplies of aggregate material of the same size group with different moisture content or specific gravity or surface characteristics affecting workability are available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another supply.

Cement shall be kept separate from the aggregates until released for discharge into the mixer. Cement shall be free of lumps and clods when discharged into the mixer. Fabric containers used for transportation or proportioning of cement shall be clean and free of residue before reuse.

Weigh systems for proportioning aggregate, cement, and mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and distinct material-weighing device.

For batches with a volume of one cubic meter or more, proportioning equipment shall conform to one of the following methods:

A. All ingredients shall be batched at a central batch plant and charged into a mixer truck for transportation to the pour site. Ingredient proportioning shall meet the requirements of Section 90-5, "Proportioning," of the Standard Specifications.
B. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote located silo and weigh system for the proportioning of the cement. The remote system shall proportion cement for charging the mixer truck.
C. All ingredients except the cement shall be batched at a central batch plant and charged into a mixer truck for transportation to a remote location where pre-weighed, containerized cement shall be added to the mixer truck. The cement pre-weighing operation shall utilize a platform scale. The platform scale shall have a maximum capacity of 2.5 tonnes with a maximum graduation size of 0.5 kilograms. Cement shall be pre-weighed into a fabric container. The minimum amount of cement to be proportioned into any single container shall be one half of the total amount required for the load of RSC being produced.
D. Cement, water, and aggregate shall be proportioned volumetrically in conformance with these special provisions.

In order to check the accuracy of batch masses, the gross mass and tare mass of truck mixers shall be determined when ordered by the Engineer. The equipment shall be weighed at the Contractor's expense on scales designated by the Engineer.

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

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced. Water added to the truck mixer at the job site shall be measured through a meter that conforms to the provisions in Section 9-1.01, "Measurement of Quantities," of the Standard Specifications.

Aggregate discharged from several bins shall be controlled by gates or by mechanical conveyors. The means of discharge from the bins and from the weigh hopper shall be interlocked so that no more than one bin can discharge at a time, and so that the weigh hopper can not be discharged until the required quantity from each of the bins has been deposited in the weigh hopper.

**Weighmaster Certificates**

Weighmaster certificates for RSC, regardless of the proportioning method used, shall include all information necessary to trace the manufacturer, and manufacturer's lot number for the cement being used. When proportioned into fabric containers the weighmaster certificates for the cement shall contain date of proportioning, location of proportioning and actual net draft mass of the cement. When proportioned at the pour site from a storage silo the weighmaster certificates shall contain date of proportioning, location of proportioning and the net draft mass of the cement used in the load.

**Replacement Base Layer**

Base materials removed shall be replaced with replacement base layer. Replacement base layer shall consist of rapid strength concrete and shall be placed in a separate and distinct operation from that of replacing concrete pavement.

Replacement base layer shall be finished to the grade shown on the plans. The surface shall not be textured and shall be finished to a smooth surface, free of mortar ridges and other projections. The finished surface shall be free from voids and porous areas.

**Bond Breaker**

Bond breaker shall be placed between replacement pavement and existing lean concrete base, cement treated base or new base replacement layer. Bond breaker shall be:

Polyethylene film conforming to the requirements in ASTM Designation: C 171, except that the minimum thickness shall be 0.15 mm, white opaque.

When polyethylene film is used, material shall be placed in a wrinkle free manner. Adjacent sheets shall be overlapped a minimum of 150 mm.

**Spreading, Compacting and Shaping**

Metal or wood side forms may be used. Wood side forms shall not be less than 38-mm thick. Side forms shall be of sufficient rigidity, both in the form and in the connection with adjoining forms, that movement will not occur under the force from subgrading and paving equipment or from the pressure of concrete.

Side forms shall remain in place until the pavement edge no longer requires the protection of forms. Side forms shall be thoroughly cleaned and oiled prior to each use.

Consolidation of RSC shall be by means of high-frequency internal vibrators after the RSC is deposited on the subgrade. Vibrating shall be done in a manner to assure uniform consolidation adjacent to forms and across the full paving width. RSC shall be placed as nearly as possible in its final position and use of vibrators for extensive shifting of the mass of RSC will not be permitted.

RSC shall be spread and shaped by suitable powered finishing machines and supplemented by hand finishing as necessary. Methods of spreading, shaping and consolidating that result in segregation, voids or rock pockets shall be discontinued. The Contractor shall use methods that will produce dense homogeneous pavement conforming to the required cross section.

After the RSC has been mixed and placed, no additional water shall be added to the surface to facilitate finishing. Surface finishing additives, when used, shall be as recommended by the manufacturer of the cement and shall be approved by the Engineer prior to use.

**Joints**

Prior to placing concrete against existing concrete, a 6-mm thick commercial quality polyethylene flexible foam expansion joint filler shall be placed across the original transverse and longitudinal joint faces and extend the full depth of the excavation. The top of the joint filler shall be placed flush with the top of pavement. Joint filler shall be secured to the joint face of the existing pavement by a method that will hold the joint filler in place during the placement of concrete.

Transverse weakened plane joints in pavement widenings shall be constructed to match the spacing and skew of the weakened plane joints in the adjacent existing pavement. Where the existing transverse weakened plane joint spacing in an adjacent lane exceeds 4.6 m, an additional transverse weakened plane joint shall be constructed midway between the existing joints. The provisions in the second and third paragraphs in Section 40-1.08B, "Weakened Plane Joints," and the third paragraph in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications shall not apply. Sawing of weakened plane joints shall be completed within 2 hours of completion of final finishing. Minimum depth of cut for weakened plane joints shall be 70 mm for pavement depths equal to 205 mm. Minimum depth of cut for weakened plane joints shall be 80 mm for pavement depths equal to 230 mm.

**Replacement Tie Bars**

Tie bars shall be installed at longitudinal joints where existing tie bars were sawn through. Locations of new tie bars shall be placed as directed by the Engineer.

Tie bars shall be deformed reinforcing steel bars conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 280 or 420 and shall be epoxy-coated in conformance with the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that references made to ASTM Designation: D 3963/D 3963M shall be deemed to mean ASTM Designation: A 934/A 934M or A 775/A 775M. Tie bars shall not be bent.

Tie bars shall not be used at joints where RSC and asphalt concrete pavements join.

Tie bars shall be installed at longitudinal joints by drilling and bonding with epoxy. Epoxy shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging). The class used shall be dependent on the internal temperature of the existing hardened concrete at the time of tie bar installation as follows: Class A for below 4.5°C, Class B for 4.5°C to 15.5°C, and Class C for above 15.5°C. Epoxy shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work. Drilled holes shall be cleaned in conformance with the epoxy manufacturer's instructions and shall be dry at the time of placing the epoxy and tie bars. Immediately after inserting the tie bars into the epoxy, the tie bars shall be supported as necessary to prevent movement during curing and shall remain undisturbed until epoxy has cured a minimum time as specified by the manufacturer. Tie bars that are improperly bonded, as determined by the Engineer, will be rejected. If rejected, new holes shall be drilled adjacent to the rejected holes, as directed by the Engineer, and new tie bars shall be placed and securely bonded to the concrete. Work necessary to correct improperly bonded tie bars shall be performed at the Contractor's expense.

**Dowel Bars**

Dowel bars shall be plain round smooth, epoxy-coated steel conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 280 or 420, the details shown on the plans and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that the two samples required in ASTM Designation D 3963/D 3963M shall be 460 mm long. Epoxy coating of dowel bars shall conform to the provisions in ASTM Designation: A 884/A 884M, Class A, Type 1 or Type 2, except that the bend test shall not apply.

Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete.

Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one liter per 3.7 $m^2$.

**Dowel Bar Baskets**

Dowel bar baskets shall be manufactured with a minimum welded wire gage number of MW 65. Baskets shall be either U-frame or A-frame shape. J-frame shapes shall not be used. Baskets shall be fabricated in conformance with the requirements in ASTM Designation: A 82. Welding of baskets shall conform to the requirements in AASHTO Designation: M 254. A broken weld will be a cause for rejection of the basket. Baskets shall be Class A, Type 1 epoxy-coated in conformance with the requirements in ASTM Designation: A 884/A 884M. Fabrication and job-site handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that sampling of epoxy-coated wire reinforcement will not be required. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated wire reinforcement certifying that the coated bars conform to the requirements in ASTM Designation: A 884/A 884M and the provisions in Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications. The Certificate of Compliance shall include the certifications specified in ASTM Designation: A 884/A 884M and a statement that the coating material has been pre-qualified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

Concrete fasteners shall be used for anchoring dowel bar baskets to RSC replacement base lean concrete base, asphalt concrete base, asphalt treated permeable base, or cement treated permeable base. Concrete fasteners shall be driven fasteners such as concrete nails, used specifically for fastening to hardened concrete. Concrete fasteners shall conform to the requirements of ASTM Designation: F 1667. Concrete nails used as fasteners shall have a minimum shank diameter of 4 mm with a minimum shank length of 64 mm. Clips and washers shall be commercial quality manufactured for use with

dowel bar baskets. The surface of concrete fasteners, clips, and washers shall be either zinc electroplated or galvanized with a minimum coating thickness of 0.005-mm.

**Tie Bar Baskets**

Tie bar baskets shall be manufactured with a minimum welded wire gage number of MW 65. Baskets shall be either U-frame or A-frame shape. J-frame shapes shall not be used. Tie bar baskets shall be fabricated in conformance with the requirements in ASTM Designation: A 82. Welding of baskets shall conform to the requirements in AASHTO Designation: M 254. A broken weld will be a cause for rejection of the basket. Baskets shall be Class A, Type 1 epoxy-coated in conformance with the requirements in ASTM Designation: A 884/A 884M. Fabrication and job-site handling shall conform to the requirements in ASTM Designation: D 3963 and the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications, except that sampling of epoxy-coated wire reinforcement will not be required. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished for each shipment of epoxy-coated wire reinforcement certifying that the coated bars conform to the requirements in ASTM Designation: A 884/A 884M and the provisions in Section 52-1.02B, "Epoxy-coated Bar Reinforcement," of the Standard Specifications. The Certificate of Compliance shall include the certifications specified in ASTM Designation: A 884/A 884M and a statement that the coating material has been pre-qualified by acceptance testing performed by the Valley Forge Laboratories, Inc., Devon, Pennsylvania.

**Reinforcement**

Reinforcement shall be epoxy coated and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

**Preformed Compression Joint Sealant**

Preformed compression seals shall conform to the requirements of ASTM Designation: D 2628. Preformed compression seals shall have 5 or 6 cells. Preformed compression seals for Types A2 and B joints shall have 4 or more cells. Lubricant adhesive used with preformed compression seals shall conform to the requirements of ASTM Designation: D 2835. Compression seals and lubricant adhesive shall be installed in conformance with the manufacturer's recommendations and these special provisions. The manufacturer's recommendations shall be submitted to the Engineer at the prepaving conference.

Each lot of compression seal and lubricant adhesive shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with storage instructions and precautionary instructions for use. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the preformed compression joint sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of joint seal prior to use on the project. The Contractor shall submit the manufacturer's data sheet with installation instructions and recommended type of preformed compression seal for the joint size and depth as shown on the plans. The manufacturer's selected compression seal shall show evidence that the seal is being compressed at level between 40 and 50 percent for the joint width and depth shown on the plans.

**Joint Filler Material**

Joint filler material shall be preformed expansion joint filler for concrete (bituminous type), conforming to the requirements of ASTM Designation: D 994.

A Certificate of Compliance for the joint filler material shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall be accompanied with a certified test report of the results of the required tests performed on the joint filler material within the previous 12 months prior to proposed use. The certificate and accompanying test report shall be provided for each lot of joint filler material prior to use on the project.

**Hydraulic Cement Grout (non-shrink)**

Hydraulic cement grout (non-shrink) shall conform to the requirements in ASTM Designation: C 1107. At the Contractor's option, clean, uniformly rounded aggregate filler may be used to extend the grout. The extension of grout shall not exceed 60 percent of the mass of the grout or the maximum amount of grout extension recommended by the manufacturer, whichever is less. The moisture content of the aggregate filler shall not exceed 0.5 percent. Grading of the aggregate filler shall conform to the following:

| Sieve Size | Percentage Passing |
|---|---|
| 12.5 mm | 100 |
| 9.5 mm | 85-100 |
| 4.75 mm | 10-30 |
| 2.36 mm | 0-10 |
| 1.10 mm | 0-5 |

**DOWEL PLACEMENT**

Dowel bars shall be centered on the joint within a tolerance of ±50 mm in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.

Dowel bars shall be placed as shown on the plans by using dowel bar baskets.

When dowel bar baskets are used, they shall be anchored to the base to hold the dowel bars at the specified depth and alignment during concrete placement without displacement. A minimum of 8 alternating, equally spaced, concrete fasteners with clips shall be used to anchor each 3.6 m dowel bar basket (4 per lower runner wire). At least 10 concrete fasteners shall be used for basket sections greater than 3.6 m and less than or equal to 4.9 m. Temporary spacer wires connecting dowel bar baskets shall be cut or removed after the dowel bar baskets are anchored into position prior to concrete placement. The Contractor shall demonstrate to the Engineer's satisfaction that dowel bar baskets are adequately anchored and not shift during concrete placement. The Contractor shall provide longer concrete nails than the minimum lengths for the varying bases beneath the Rapid Strength Concrete when anchored dowel bar baskets demonstrate movement.

Full compensation for providing longer concrete nails shall be considered as included in the contract unit price paid for dowel (smooth, epoxy coated) and no additional compensation will be allowed therefor.

| Dowel bar placement at transverse | |
|---|---|
| Horizontal offset | ±25 mm |
| Longitudinal translation | ±50 mm |
| Horizontal skew | 9 mm |
| Vertical skew | 9 mm |
| Vertical depth | (d/3 +12 mm) from pavement surface to top of dowel bar or –15 mm below planned placement |

Note: d = pavement thickness in mm

**CORE DRILLING FOR DOWEL BAR AND PLACEMENT ALIGNMENT ASSURANCE TESTING**

Coring to confirm dowel bar placement, alignment, and concrete consolidation shall be provided by the Contractor throughout the project, at locations determined by the Engineer. Each day's paving shall be cored within 2 days by performing a minimum of 2 and a maximum of 4 tests for dowel bar placement and position for every 1670 $m^2$ of doweled pavement. One test shall consist of drilling two cores, one on each end of a dowel bar to expose both ends and allow measurement for proper alignment. The minimum core hole diameter shall be 127 mm. If the cores indicate that dowel bars are not within the allowable tolerances or if air voids exist surrounding the dowel bars, additional cores will be required to determine the limits and severity of unacceptable work.

The holes shall be cored by methods that will not damage the concrete adjacent to the holes. Immediately after coring, the concrete cores shall be submitted to the Engineer for inspection, and the cores shall be identified by the Contractor with a location description.

After removal of cores, core hole voids in concrete pavement shall be cleaned and filled with hydraulic cement grout (non-shrink). After placement of hydraulic cement grout, the material while still plastic shall be finished and textured to match the adjacent pavement surface. The backfill material shall be the same level as the pavement surface.

Water for core drilling operations shall be from a local domestic water supply, and shall contain not more than 1000 parts per million of chlorides as CL, nor more than 1300 parts per million of sulfates as $SO_4$, nor shall it contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Dowel bar alignment shall be within the specified tolerances. If dowel bars or tie bars are found to be installed improperly, the paving operations shall not continue until the Contractor has demonstrated to the Engineer that the problem which caused the improper dowel bar or tie bar positioning has been corrected.

Dowel bars in rejected joints shall be replaced by the Contractor by saw cutting on each side of the rejected joint a minimum of 0.9-m, lifting out concrete to be removed, installing new dowel bars at the new transverse joints, installing

dowel bars and preformed sponge rubber expansion joint filler along the longitudinal joints, placing concrete, and installing new joints. Preformed sponge rubber expansion joint filler shall conform to the requirements in ASTM Designation: D 1752. New dowel bar holes shall be drilled, not more than 3 mm greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowels to be installed at the contact joints. Dowel bars shall be placed, as shown on the plans, for the 2 new transverse contact joints. Original exposed tie bars, located within the slab replacement area, shall be cut flush with the lane or pavement edge and dowel bars shall be installed to replace the tie bars at an offset of 75 mm, horizontally from the tie bar location. Holes for dowel bars to be placed along the longitudinal joint shall be drilled, not more than 3 mm greater than the dowel bar diameter, by the use of an automatic dowel-drilling rig for the dowel bars to be installed at the contact joints.

When requested by the Contractor and approved by the Engineer, dowel bars which are more than ±50 mm but less than ±75 mm from being centered directly over the sawcut for the transverse weakened plane joint, may remain in place, and the Contractor shall pay to the State the amount of $32.30 per square meter for the quantity of concrete pavement panels represented by the cores indicating incorrect dowel bar alignment or improper concrete consolidation around dowels. The quantity of concrete pavement area used to determine the amount of payment to the State will be calculated using the panel dimensions for panels adjacent to and inclusive of the joints with incorrect dowel bar alignment or improper concrete consolidation around dowel bars. The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation shall be in addition to other adjustments for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate," of the Standard Specifications.

The Department will reduce compensation from moneys due, or that may become due to the Contractor under the contract. This reduced compensation will be in addition to other adjustments for incorrect dowel bar alignment or improper concrete consolidation around dowel bars as specified in these special provisions and for pavement thickness deficiency in conformance with the provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications and in addition to other adjustments for deficient Cleanness Value and coarse aggregate grading; and for deficient Sand Equivalent and fine aggregate grading in conformance with the provisions in Section 90-2.02, "Aggregate," of the Standard Specifications.

**PREFORMED COMPRESSION JOINT SEAL INSTALLATION**

The compression seal alternative joint detail for transverse and longitudinal joints, as shown on the plans, shall apply to weakened plane joints and longitudinal isolation joints. Weakened plane joints shall be constructed by the sawing method. Should grinding or grooving be required over or adjacent to any joint after the compression seal has been placed, the joint materials shall be removed and disposed of, and replaced at the Contractor's expense. Compression seals shall be recessed below the final finished surface as shown on the plans.

Transverse weakened plane joints shall be Type A1 as shown on the plans. Longitudinal weakened plane joints shall be Type A2 as shown on the plans.

Seven days after the concrete pavement placement and not more than 4 hours before placing preformed compression joint seals,the joint walls shall be cleaned by the dry sand blast method and other means as necessary to remove from the joint objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 50 mm on each side of the joint by the use of a vacuum device. Surface moisture or dampness shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 6 ± 1 mm and a minimum pressure of 0.62-MPa.

Longitudinal seals shall be installed before installing transverse seals. Longitudinal seals shall be continuous except at intersections with transverse seals. Transverse seals shall be installed in one continuous piece throughout each transverse joint. After the longitudinal seal is completed and the transverse seal is ready to be installed, a single cut with a sharp instrument or saw shall be made across the longitudinal seal at the middle of the intersection with the transverse seal. After the initial cut of the longitudinal seal, if the longitudinal joint material does not relax enough to allow proper installation of the transverse seal, the longitudinal joint material shall be trimmed precisely to accommodate the transverse seal and form a tight seal between the 2 joints.

An installation machine specifically designed for the installation of preformed compression joint seals shall be used to install the seal at the specified depth without cutting, nicking, or twisting the seal. The installation machine shall install the seal with no more than 4 percent stretch in the installed seal. Hand installation methods of installing seals will not be permitted.

The percentage of stretch shall be determined by laying a length of the preformed compression joint seal material cut to the exact length of the pavement joint to be sealed. The length shall then be measured. The cut length of preformed compression joint seal material shall then be installed in the joint. Excess amount of seal material remaining at the end of the

joint shall be measured as the amount of stretch. The measured amount of stretch shall be divided by the original measured length to determine the percentage of stretch.

The completed seal shall not be twisted or have deformities that prevent the seal from making complete continuous contact with the joint walls. Seals installed that are twisted or deformed, or do not make continuous contact with joint walls or with greater than 4 percent stretch of the joint material will be rejected and removed.

**CONSTRUCTING LONGITUDINAL ISOLATION JOINTS**

Final alignment of perpendicular transverse weakened plane joints in pavement shall not be made to match the spacing or skew of the weakened plane joints in the existing parallel concrete pavement. Tie bars shall not be placed across longitudinal isolation joints. Prior to placing concrete, joint filler material shall be placed as shown on the plans. The joint filler shall be secured to the face of the existing pavement joint face by a method that will hold the joint filler in place and prevent the new concrete from adhering to the existing concrete, during placement of concrete.

Sealant for longitudinal isolation joints shall be preformed compression seal and placed in conformance with the requirements for preformed compression seal installation as specified above.

**CONSTRUCTING TRANSVERSE JOINT CONNECTIONS AND ANCHORS**

Concrete pavement joints at transitions to asphalt concrete pavement, pavement end anchors and bridge approach slabs shall conform to the details as shown on the plans. Paint binder shall be applied to the concrete surface that asphalt concrete pavement will contact. Paint binder shall be applied in conformance with the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications.

**PROFILE INDEX**

The pavement surface shall be profiled, by the Contractor not more than 10 days following concrete placement, in the presence of the Engineer, using a California Profilograph or equivalent in conformance with the requirements in California Test 526, except a blanking band of zero (null) shall be used to determine the Profile Index. Two profiles shall be made within each traffic lane, one meter from and parallel with each lane line.

Profiled pavement shall conform to the following Profile Index requirements:

A. Pavement on tangent alignment and pavement on horizontal curves having a centerline radius of curve 600 m or more shall have a Profile Index of 64 mm or less for each 0.1-km.
B. Pavement on horizontal curves having a centerline radius of curve 300 m or more but less than 600 m and pavement within the superelevation transition of those curves shall have a Profile Index of 128 mm or less for each 0.1-km.

Individual high points in excess of 7.5 mm, as determined by measurements of the profilogram in conformance with the requirements in California Test 526, except using a blanking band of zero (null), shall be reduced by grinding in conformance with the requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications until the high points as indicated by reruns of the profilograph do not exceed 7.5 mm.

Pavement grinding shall not be performed before 10 days have elapsed after concrete placement, nor before the concrete has developed a modulus of rupture of at least 3.8 MPa.

**CONSTRUCTING WEAKENED PLANE JOINTS (EARLY ENTRY SAW METHOD)**

The Contractor may construct weakened plane joints using lighter weight concrete saws (early entry saws) specifically designed for sawing fresh concrete without the use of water. The early entry saws shall be capable of sawing joints within 2 hours of cure time after placement of the concrete pavement without ravelling or tearing, as defined in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications. Joints sawed with early entry saws that develop random cracking shall be removed to the nearest controlled joint and replaced with concrete pavement containing dowel bars and tie bars in conformance with these special provisions and as shown on the plans. The removal and replacement work shall be at the Contractor's expense. Weakened plane joints not sawed within 2 hours of placing concrete pavement shall be sawed by conventional power driven wet-type concrete saws in conformance with the requirements of Section 40-1.08B(1), "Sawing Method," of the Standard Specifications.

Sawed grooves shall be cut to a maximum of 3 mm in width for longitudinal and transverse weakened plane joints made with early entry saws. The minimum depth of cut shall be calculated utilizing the formula in Section 40-1.08B(1), "Sawing Method," of the Standard Specifications except $d = t/4$.

**TIE BARS ALONG LONGITUDINAL JOINT FOR SHORT RADIUS CURVES**

When paving along short radius curves, the transverse joints shall be maintained in a single continuous straight line across lanes, through the radius point. Tie bars shall maintain minimum clearance from the transverse joint as shown on the

plans. If the inside or outside curve of the panel does not allow equal uniform spacing of tie bars at 710 mm between tie bars, then the tie bars shall be equally spaced so that a minimum spacing of 375 mm to a maximum spacing of 710 mm is maintained between tie bars. Additional tie bars shall be considered as included in the contract price paid per cubic meter for concrete pavement and no additional compensation will be allowed therefore.

### Final Finishing

Tests to determine coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Any tests to determine the coefficient of friction will be made after the pavement is opened to public traffic, but not later than 5 days after concrete placement. Pavement areas having a coefficient of friction as determined in conformance with the requirements in California Test 342 of less than 0.30 shall be grooved in conformance with the provisions in Section 42-1.02, "Construction," of the Standard Specifications. Grooving shall be performed prior to the installation of any required edge drains adjacent to the areas to be grooved.

Transverse straightedge and longitudinal straightedge requirements will not apply to the pavement surface within 300 mm of the existing concrete pavement except as required in these special provisions. Longitudinal straightedge requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications, shall be applied at transverse contact joints with existing concrete pavement where the straightedge is to be placed with the midpoint coincident with the joints. Pavement not meeting this straightedge requirement shall be corrected within 48 hours by grinding or other methods as approved by the Engineer.

Profiles of the completed pavement surface specified in Section 40-1.10, "Final Finishing," of the Standard Specifications will not be required. The Profile Index requirements in Section 40-1.10, "Final Finishing," of the Standard Specifications shall not apply.

### Curing Method

The curing method for replacement pavement shall be as recommended by the manufacturer of the cement and as approved by the Engineer.

## QUALITY CONTROL PROGRAM

### General

The Contractor shall establish, provide and maintain a quality control program that will provide assurance to the Engineer that all materials and completed construction conform to the contract requirements specified herein.

At least 21 days prior to the placement of the trial slab the Contractor shall submit to the Engineer for approval a written Quality Control Plan (QCP) that shall be used to ensure the quality of the product and the work. At the request of the Engineer or Contractor, the Contractor and Quality Control Managers (QCMs) shall meet with the Engineer to discuss the QCP. The Engineer will have 14 days to approve the Quality Control Plan (QCP). Should the Engineer fail to complete the review of the Quality Control Plan (QCP) within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the Quality Control Plan (QCP), the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If in the judgement of the Engineer, the Contractor has not implemented or is not complying with the approved QCP, production and placement shall be suspended. Production and placement shall not resume until approved by the Engineer.

### Quality Control Plan

The Contractor shall provide a QCP that describes the procedures that the Contractor will use to control the production process, to determine when changes to the production process are needed, and to propose procedures for implementing changes for replacement pavement operations. The QCP shall also include an outline for the placement and testing of the trial slab.

Replacement pavement production and placement shall not begin until the QCP has been approved by the Engineer. Approval of the QCP will be based on the inclusion of all required information. Approval of the QCP does not imply any warranty by the Engineer that adherence to the QCP will result in replacement pavement that complies with these specifications. It shall remain the responsibility of the Contractor to demonstrate this compliance.

The QCP shall include the names and qualifications of the lead QCM and the assistant QCM. The lead QCM shall be responsible for the administration of the QCP. The lead QCM shall have current American Concrete Institute (ACI) certification as "Concrete Field Testing Technician-Grade I" and "Concrete Laboratory Testing Technician-Grade II." The assistant QCM shall have current ACI certification as "Concrete Field Testing Technician-Grade I" and either "Concrete Laboratory Testing Technician-Grade I" or "Concrete Laboratory Testing Technician-Grade II." All sampling, inspection and test reports shall be reviewed and signed by the QCM responsible for the production period involved prior to submittal to

the Engineer. At least one QCM shall be present for each stage of mix design, trial slab construction, during production and construction of replacement pavement and for all meetings between the Contractor and Engineer relating to production, placement or testing of replacement pavement. The QCMs shall not be members of production or paving crews, inspectors or testers on the project during production or placement of replacement pavement. QCMs shall have no duties other than those referenced in these special provisions during the production and placement of replacement pavement.

The QCP shall include an outline of the production, transportation and placement of the replacement pavement. The QCP shall include a contingency plan for correcting situations if there is a problem in production, transportation or placement. The Contractor shall have equipment and personnel present to meet the requirements of the contingency plan. The QCP shall contain provisions for determining when placement of the replacement pavement will be suspended and temporary roadway will be substituted.

The QCP shall include the names of quality control personnel to be used and an outline of sampling, testing to be performed during and after construction of replacement pavement. At the time of submission of the QCP, quality control samplers and testers must be Caltrans qualified by the Department through the Independent Assurance Program (IAP) for the sampling and testing for which they will be responsible.

Before production and placement begins, the Contractor, QCMs and Engineer shall have a meeting with all production, transportation, placement, inspection, sampling and testing personnel to familiarize them with the requirements of the project. Items to be discussed include the production, transportation and placement processes for replacement pavement; contingency plan; and sampling and testing. The Contractor shall provide the facility for this meeting. The meeting date and location will be approved by the Engineer. Attendance at this meeting is mandatory for key personnel including the project manager, QCMs, production plant manager, plant inspector, all concrete delivery truck drivers, paving superintendent, paving foreman, paving machine operator, and all inspectors, samplers and testers. All meeting attendees shall sign in at the meeting. Production and placement operations shall not begin unless the above key personnel have attended the mandatory meeting.

**Quality Control Inspection, Sampling and Testing**

The Contractor shall perform quality control inspection, sampling and testing to ensure that replacement pavement production and placement conform to the provisions specified herein.

The Contractor shall provide the required sampling, testing and inspection during all phases of replacement pavement production and placement. The Contractor shall provide a minimum of two working days notice to the Engineer, so the Engineer can witness all sampling and testing. The Engineer shall be given unrestricted access to the Contractor's quality control inspectors, samplers, testers and laboratories. During the production and placement period, the Contractor shall provide results of all testing to the Engineer within 15 minutes of completion of testing. The Contractor shall record all inspection, sampling and testing on forms approved by the Engineer. The Contractor shall provide written results of all inspection and testing to the Engineer within 48 hours of completion of each shift of paving and within 24 hours for all 7-day strength tests.

The Contractor shall provide a testing laboratory with adequate equipment and personnel for the performance of the quality control tests. This laboratory shall be located at a location approved by the Engineer and so that prompt testing requirements will be achieved. All sampling and testing equipment shall be maintained in proper working condition. Sampling shall be performed in conformance with the requirements of California Test 125. The QCP shall include a list the equipment to be used including date of last calibration, the names and certifications of sampling and testing personnel, and the location of the laboratory and testing equipment during and after paving operations.

Testing laboratories, testing equipment, and sampling and testing personnel shall conform to the requirements of the Department's IAP.

**Trial Slab and Process Control Testing**

Prior to construction of RSC pavement, the Contractor shall construct one or more trial slabs under conditions similar to those that will exist during pavement replacement, for each mix design, to show that personnel, equipment, and mixing, placing, curing, and sawing techniques will produce a concrete pavement conforming to these special provisions in the anticipated time period under similar atmospheric and temperature conditions as pavement construction and to establish the correlation described below. During production and placement, the Contractor shall conform to the requirements of these special provisions and to the procedure outlined in the QCP to ensure that mixing, transporting, placing, finishing, curing and sawing techniques and that personnel and equipment to be used will produce replacement pavement conforming to these special provisions.

A trial slab shall be constructed using the approved mix design, admixtures and conditions for batching. During construction of trial slab, the Contractor shall demonstrate placement at the minimum and maximum times allowed from batching to placement. RSC pavement within the roadway shall not proceed until a trial slab meeting the requirements of these special provisions has been constructed.

The minimum trial slab dimensions shall be 3 m by 6 m and shall be 225 mm thick where planned replacement pavement nominal thickness is less than 255 mm. The trial slab thickness shall be 260 mm where planned replacement pavement

nominal thickness is 255 mm or greater. Where there are planned slab replacements with greater and less than 255 mm thickness then two trial slabs shall be required one at 225 mm thick and one at 255 mm thick. Trial slabs shall be placed near the project site at a location mutually acceptable to the Engineer and the Contractor except slabs shall not be placed on the roadway or within the project limits.

During trial slab construction, the Contractor shall sample and split the aggregate for gradings, cleanness value, and sand equivalent testing with the Engineer, at the Contractor's cost. Both sets of test results of these samples shall conform to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. If test results do not conform to the requirements, the trial slab will be rejected.

During trial slab construction and within 20 minutes of RSC delivery, beams shall be fabricated in conformance with the requirements in California Test 523. Beams shall be used to determine early age and 7-day modulus of rupture values. Beams fabricated for early age testing shall be cured so that the monitored temperature in the beams and the trial slab are within 3°C at all times. Internal temperatures of the trial slab and early age beams shall be monitored and recorded at minimum time intervals of 5 minutes by installing thermocouples and or thermistors connected to strip-chart recorders or digital data loggers. Temperature recording devices shall be accurate to within ±1ºC. Internal temperature readings shall be measured at 25 mm from the top and 25 mm from the bottom, no closer than 75 mm from any edge of the concrete elements, until the early age testing is completed. Beams fabricated for 7-day testing shall be cured in conformance with the requirements in California Test 523, except beams shall be placed into sand at between 5 and 10 times the final set time or 24 hours, whichever is earlier. Testing shall be performed by the Contractor and witnessed by the Engineer. At the Engineer's request, the Contractor shall produce samples for the Engineer to test. Strength results from beams shall be the basis for determining whether RSC pavement operations may proceed. Trial slabs 225 mm thick shall have an early age modulus of rupture of not less than 2.8 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Trial slabs 260 mm thick shall have an early age modulus of rupture of not less than 2.3 MPa and a 7-day modulus of rupture of not less than 4.2 MPa. Beams failing early age or 7-day modulus of rupture requirements shall be cause for the rejection of the trial slab.

When proposed by the Contractor, in writing, and approved by the Engineer, ASTM Designation: C 805 or C 900 shall be used to estimate the modulus of rupture of the pavement at early ages. The selected test method shall be used to determine modulus of rupture until 7 days after the Contractor notifies the Engineer of withdrawal of the proposal or 7 days after the Engineer notifies the Contractor of withdrawal of approval, in writing. During trial slab curing, correlation testing shall be performed to determine the relation between the modulus of rupture and ASTM Designation: C 805 or C 900 performed on the trial slab. The correlation shall be established by testing at 4 or more time intervals. At a minimum, tests shall be performed one hour before and one hour after the opening age and two others within 15 minutes of the opening age. Modulus of rupture estimates shall be calculated with either a linear, exponential or logarithmic, least squares best-fit equation, whichever provides the best correlation coefficient.

The Contractor shall state in detail the intended location and time; procedure for production, placement and finishing of RSC pavement; sampling, sample curing and sample transportation; testing and reporting of test results for the trial slab in the QCP.

**Process Control and Quality Control Testing**

The Contractor shall provide continuous process control and quality control sampling and testing throughout production and placement of replacement pavement.

During production of RSC for replacement pavement operations, the Contractor shall sample and test aggregates at least once every 500 cubic meters of RSC produced but not less than once per placement shift. Aggregates shall be tested for conformance with gradations, cleanness value and sand equivalent requirements.

During placement of RSC pavement, the Contractor shall fabricate specimens and test for modulus of rupture within the first 25 cubic meters, within the final truckload and at least once every 100 cubic meters.

During placement of RSC, the Contractor shall sample and test for yield, penetration, air content and unit weight at least once in every 500 cubic meters RSC produced but not less than twice per placement shift.

At the Engineer's request, the Contractor shall provide split samples and fabricate beams for the Engineer to test. The cost of sampling, fabricating and transporting extra samples will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications. When, in the opinion of the Engineer, RSC fails to conform to the mix design requirements or the requirements of these special provisions, the Contractor shall provide samples and testing at the direction of the Engineer. If the material fails to meet requirements of these special provisions, cost of sampling and testing shall be at the Contractor's expense. If the material meets the requirements of these special provisions, the cost of sampling and testing will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

Beams used for determining early age modulus of rupture shall be cured under the same conditions as the pavement until one hour prior to testing. Beams fabricated for the 7-day test shall be cured in conformance with California Test 523 as modified in these special provisions. Modulus of rupture test results will be used for accepting or rejecting the replacement pavement and pay factor adjustment for low modulus of rupture.

Materials resulting from the construction of the trial slab, test specimens, temporary roadway structural section, and all rejected replacement pavement shall become the property of the Contractor and shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

**REPLACE EXISTING PAVEMENT DELINEATION**

Whenever existing pavement delineation is removed, obliterated or damaged due to the work involved in replacing concrete pavement, the Contractor shall replace the delineation in conformance with the requirements of these special provisions.

**MEASUREMENT AND PAYMENT**

Replace concrete pavement (Rapid Strength Concrete) will be measured and paid for in the same manner specified for concrete pavement in Sections 40-1.13, "Measurement," and 40-1.14, "Payment," of the Standard Specifications, and these special provisions.

Replace concrete pavement (Rapid Strength Concrete) payments will be subject to the pay factor values listed in "Pay Factor Adjustment for Low Modulus of Rupture" of these special provisions.

Full compensation for the pre-operation conference, including furnishing the facility to hold the pre-operation conference in, shall be considered as included in the contract prices paid for the item involving RSC and no additional compensation will be made therefor.

Costs for providing JITT will be made in conformance with the provisions in Section 9-1.03, "Force Account Payment," of the Standard Specifications, except no markups shall be added, and the Contractor will be paid for one half of the JITT cost. Costs for providing JITT shall include training materials, class site, and the JITT instructor including the JITT instructor's travel, lodging, meals and presentation materials. All costs incurred by the Contractor or Engineer for attending JITT shall be borne by the party incurring the costs.

The provisions in Section 40-1.135, "Pavement Thickness," of the Standard Specifications shall not apply.

Full compensation for removing and disposing of existing concrete pavement and underlying base, constructing trial slabs, furnishing and placing bond breaker, furnishing and disposing of standby materials for temporary roadway structural section, and constructing, maintaining, removing and disposing of temporary roadway structural section, and quality control program shall be considered as included in the contract price paid per cubic meter for replace concrete pavement (Rapid Strength Concrete), and no additional compensation will be allowed therefor.

The contract unit price paid for tie bar (drill and bond) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in placing epoxy-coated tie bars, drilling holes and bonding tie bars with epoxy resin, or furnishing and placing threaded dowel splice couplers, in concrete pavement complete in place, including properly aligning tie bars as shown on the plans, as specified in the Standard Specifications, and these special provisions, and as directed by the Engineer.

Sealing longitudinal and transverse weakened plane joints, and longitudinal isolation joints in Rapid Strength Concrete pavement will be measured by the meter.

The contract price paid per meter for seal pavement joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing pavement joints complete in place, including sawing, cleaning and preparing the joints in the concrete pavement, furnishing and installing compression seal, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per meter for seal longitudinal isolation joint shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in sealing longitudinal isolation joints complete in place, including sawing, cleaning and preparing the joints in the concrete pavement, furnishing and installing joint filler material, repairing and patching spalled or raveled sawed joints, and replacing or repairing rejected joints, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No deduction will be made for the volume of epoxy-coated dowel bars, epoxy-coated tie bars and, when used, tie bar baskets with fasteners and dowel bar baskets with fasteners, in the concrete pavement.

Full compensation for core drilling for dowel bar alignment and backfilling with hydraulic cement grout shall be considered as included in the contract unit price paid for dowel (smooth, epoxy coated) and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars are out of alignment tolerances and the Engineer orders additional dowel bar coring, full compensation for drilling the additional cores shall be considered as included in the contract unit price paid for dowel (smooth, epoxy coated) and no additional compensation will be allowed therefor.

If the initial cores show that dowel bars are within alignment tolerances and the Engineer orders more dowel bar coring the additional cores will be paid for as extra work in conformance with the provisions in Section 4-1.03D, "Extra Work," of the Standard Specifications.

The contract unit price paid for dowel (smooth, epoxy coated) and, when used, any dowel bar baskets with fasteners shall include full compensation for furnishing all labor, material, tools, equipment and incidentals and for doing all the work involved in dowel (smooth, epoxy coated), complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer. Full compensation for drilling holes and bonding dowel bars with epoxy resin shall be considered as included in the contract unit price paid for dowel (smooth, epoxy coated) and no additional compensation will be allowed therefor.

## 10-1.25 SEAL EXISTING CONCRETE PAVEMENT JOINT

This work shall consist of constructing joint seal reservoirs at existing transverse and longitudinal weakened plane joints and placing joint sealant as shown on the plans and as specified in these special provisions.

### MATERIALS

#### Asphalt Rubber Joint Sealant

Asphalt rubber joint sealant shall conform to the requirements of ASTM Designation: D 3405 as modified herein or to the following:

1. Asphalt rubber joint sealant shall be a mixture of paving asphalt and ground rubber. Ground rubber shall be vulcanized or a combination of vulcanized and devulcanized materials ground so that 100 percent will pass a 2.36-mm sieve. The mixture shall contain not less than 22 percent ground rubber, by mass. Modifiers may be used to facilitate blending.
2. The asphalt rubber sealant shall have a Ring and Ball softening point of 57°C minimum, when tested in conformance with the requirements in AASHTO Designation: T 53.
3. The asphalt rubber sealant material shall be capable of being melted and applied to cracks and joints at temperatures below 204°C.

The penetration requirement of Section 4.2 of ASTM Designation: D 3405 shall not apply. The required penetration at 25°C, 150 g, 5 s, shall not exceed 120.

The resilience requirement of Section 4.5 of ASTM Designation: D 3405 shall not apply. The required resilience, when tested at 25°C, shall have a minimum of 50 percent recovery.

Prior to use on the project, each lot of asphalt rubber joint sealant shipped to the job site shall be accompanied by a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, and shall be accompanied with storage and heating instructions and precautionary instructions for use. The Certificate of compliance shall also be accompanied with a certified test report of the results of the required tests performed on the joint sealant material within the previous 12 months prior to proposed use.

Asphalt rubber joint sealant materials shall be heated and placed in conformance with the manufacturer's written instructions and the details shown on the plans. The manufacturer's instructions shall be provided to the Engineer at least 7 days before beginning sealant placement operations. Asphalt rubber joint-sealant materials shall not be placed when the pavement surface temperature is below 10°C.

#### Backer Rod

Backer rod shall be an expanded, closed-cell polyethylene foam that is compatible with the joint sealant so that no bond or adverse reaction occurs between the rod and sealant.

### PREPARE JOINTS IN EXISTING CONCRETE PAVEMENT

Transverse pavement joint seals shall be the poured sealant type and shall be, at the Contractor's option, either Type DSC or Type SSC as shown on the plans. Longitudinal joint seals shall be the poured sealant Type SSC as shown on the plans.

#### Construct Joint Sealant Reservoir

Joint sealant reservoirs shall be constructed in existing concrete pavement at transverse weakened plane joints by the sawing method. The size and shape of the sealant reservoir shall conform to the details shown on the plans. Residue from sawing operations to construct reservoirs in existing concrete pavement shall be picked up by means of a vacuum attachment to the sawing machine and shall not be allowed to flow across the pavement nor be left on the surface of the pavement.

Removed concrete pavement and residue from sawing involved in constructing reservoirs in existing concrete pavement shall become the property of the Contractor and shall be disposed in conformance with the requirements in Section 7-1.13, "Disposal of Materials Outside the Highway Right of Way," of the Standard Specifications. In addition, if the Contractor elects to dispose of residue at a location other than those where arrangements have been made by the Department, the

Contractor shall obtain approval from the California Regional Water Quality Control Board having jurisdiction over the location. A copy of the approval shall be provided to the Engineer before disposing of material at the location.

**Cleaning the Joint**

The joint shall be cleaned of dust, dirt, or visible traces of old sealant. Chemical solvents shall not be used to wash the joint. Immediately after sawing, plowing or cutting, or manual removal, slurry or remaining debris from the removal operations shall be removed. The cleaning operation shall be performed in one direction to minimize contamination of surrounding areas. Surface moisture shall be removed at the sealant reservoir by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the reservoir wall shall not be used. After reservoir drying, the reservoir shall be sandblasted to remove remaining residue. Sandblasting straight into the reservoir will not be allowed. The sandblast nozzle shall be pointed close to the surface at an angle to clean each reservoir face. A minimum of one pass along each reservoir face shall be made. The reservoir shall then be air blasted to remove sand, dirt, and dust, no more than one hour before placement of sealant. Compressed air used to air blast the reservoir shall not introduce oil into the reservoir. If oil is accidentally introduced into the reservoir, the Contractor shall begin the cleaning process again until the Engineer is satisfied that the reservoir is clean. Compressed air shall be delivered at a minimum rate of 3.40 $m^3$ per minute and develop at least 0.62-MPa nozzle pressure. A vacuum sweeper shall be used to remove debris or contaminants from the surrounding pavement surfaces after air blasting.

**Backer Rod Installation**

Backer rods shall be installed after joint cleaning. Backer rods shall be installed as shown on the plans. Backer rods shall be installed when the temperature of the portland cement concrete pavement is above the dew point of the air and when the air temperature is 4°C or above. Backer rod shall be installed when the joints to be sealed have been properly patched, cleaned and dried, as determined by the Engineer. Methods of placing backer rods that leave a residue or film on the reservoir walls, shall not be used.

**Sealant Installation**

The reservoir walls shall be dry before installing the sealant. No sealant shall be installed before it reaches proper manufacturer's recommended installation temperature. The Contractor shall evacuate any cooled sealant and flushing oil that remains from the pumping hoses and nozzle. This evacuated material shall be discarded. Installation of the sealant shall begin only after fresh sealant is ejected from the nozzle at an acceptable temperature.

Joints shall have the sealant recessed below the final finished surface as shown on the plans.

Sealant shall be pumped through a nozzle sized for the width of the sealant reservoir. The nozzle shall fit into the reservoir to allow pumping to the bottom. The nozzle shall be drawn toward the body of the installer versus pushing to reduce the possibility of air voids. Sealant shall not fill the reservoir to the top level of the joint surface.

After pumping the sealant, the Contractor shall draw a tool or backer rod strip over the fresh sealant. The sealant shall be tooled within 10 minutes of installation or before the sealant begins to form a skin as it cures.

After each joint is sealed, surplus joint sealer on the pavement surface shall be removed. Traffic will not be permitted over the sealed joints until the sealant is track free and set sufficiently to prevent embedment of roadway debris into the sealant.

Failure of the joint material in either adhesion or cohesion of the material will be cause for rejection of the joint.

Removed material or material generated by the Contractor's operations shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

**MEASUREMENT AND PAYMENT**

Sealing pavement joints in existing portland cement concrete pavement will be measured by the meter.

The contract price paid per meter for seal joint (existing concrete pavement) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing joint seals in existing concrete pavement, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

## 10-1.26 GRIND EXISTING CONCRETE PAVEMENT

This work shall consist of grinding existing portland cement concrete as shown on the plans, as specified in Section 42-2, "Grinding," of the Standard Specifications and these special provisions, and as directed by the Engineer.

Grinding equipment for grinding concrete pavements shall use diamond blades mounted on a self-propelled machine designed for grinding and texturing concrete pavements. Grinding equipment that causes raveling, aggregate fracturing, or spalling, or that damages the transverse or longitudinal joints shall not be used.

Grinding shall be performed in the longitudinal direction of the traveled way and shall be done full lane width so that the grinding begins and ends at lines perpendicular to the pavement centerline.

Grinding concrete pavement shall result in a parallel corduroy texture consisting of grooves 2 mm to 3 mm wide with 183 to 193 grooves per meter width of grinding. Tops of ridges shall be between 1.5 mm and 2.0 mm from the bottom of the blade grooves.

The ground surface at transverse joints or cracks will be tested with a 3.6 m ± 0.06-m long straightedge laid on the pavement parallel with the centerline with its midpoint at the joint or crack. The surface shall not vary by more than 2 mm from the lower edge of the straightedge.

Cross-slope uniformity and positive drainage shall be maintained across the entire traveled way and shoulder. The cross-slope shall be uniform so that when tested with a 3.6 m ± 0.06-m long straightedge placed perpendicular to the centerline, the ground pavement surface shall not vary more than 6 mm from the lower edge of the straightedge.

After grinding has been completed, the pavement surface shall be profiled in conformance with the requirements of Section 40-1.10, "Final Finishing," of the Standard Specifications. Two profiles shall be obtained in each lane approximately one meter from the lane lines. The average profile index shall be determined by averaging the two profiles in each lane. Additional grinding shall be performed, where necessary, to bring the ground pavement surface within the Profile Index requirements specified in Section 40-1.10, "Final Finishing," of the Standard Specifications.

Full compensation for profiling the ground pavement surface with a California profilograph or equivalent and any necessary additional grinding to bring the finished surface within the specified tolerances and for furnishing final profilograms to the Engineer shall be considered as included in the contract price paid per square meter for grind existing concrete pavement and no additional compensation will be allowed therefor.

## 10-1.27 DISPOSAL OF PORTLAND CEMENT CONCRETE (PCC) PAVEMENT GROOVING AND GRINDING RESIDUES

Disposal of portland cement concrete (PCC) pavement grooving and grinding residues shall be in conformance with the provisions in Section 42, "Groove and Grind Pavement," of the Standard Specifications and these special provisions.

The Contractor shall include water pollution control measures to address the handling of the grinding pavement residue within the Storm Water Pollution Prevention Plan or Water Pollution Control Program, as specified in "Water Pollution Control," of these special provisions.

Temporary storage of PCC pavement grooving and grinding residues shall not be allowed within the highway right of way. The Contractor may transport liquid PCC pavement grooving and grinding residues to an offsite drying location if the Engineer provides written approval. The offsite drying location shall be identified and protected in conformance with "Water Pollution Control," of these special provisions.

A Materials Information Handout is not available for disposal of PCC pavement grooving or grinding residues. The Contractor shall dispose of PCC pavement grooving and grinding residues in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside of the Right of Way," of the Standard Specifications. The facilities listed below were permitted by Regional Water Quality Control Board (RWQCB) or other agencies that may accept PCC pavement grinding and grooving residues as of July 1, 2004. If the Contractor is planning to use one of these sites, the Contractor shall determine if the facility has a current permit to accept PCC pavement grooving and grinding residues and if the facility can accept the waste at the time of generation.

| SITE NAME | LOCATION | TELEPHONE | WASTE TYPES / RESTRICTIONS |
|---|---|---|---|
| Clean Harbors Environmental Services Buttonwillow | 2500 West Lokern Road Buttonwillow, CA | (562) 432-5445 | Hazardous Solids and Non-Hazardous Liquids and Solids |
| Clean Harbors Environmental Services San Jose | 1021 Berryessa San Jose, CA | (408) 451-5000 | Hazardous and Non-Hazardous Liquids |
| Crosby & Overton, Inc. | 1610 W. 17th Street Long Beach, CA | (562) 432-5445 | Hazardous and Non-Hazardous Liquids |
| D/K Environmental | 3650 East 26th Street Vernon, CA | (323) 268-5056 | Hazardous and Non-Hazardous Liquids and Solids |
| DeMenno-Kerdoon | 200 N. Alameda Street Compton, CA | (323) 268-5057 (310) 537-7100 | Hazardous and Non-Hazardous Liquids and Solids |
| Filter Recycling Services, Inc. | 180 West Monte Avenue Rialto, CA | (909) 424-1630 | Hazardous and Non-Hazardous Liquids |
| K-Pure Water Works | 8910 Rochester Ave Rancho Cucamonga, CA | (909) 476-2308 | Non-Hazardous Liquids |
| Liquid Waste Management McKittrick | 56533 Highway 58 McKittrick, CA | (559) 386 - 6104 | Non-Hazardous Liquids and Solids |
| Onyx Environmental Services LLC | 1704 W. First Street Azusa, CA | (626) 334-5117 | Hazardous and Non-Hazardous Liquids and Solids |
| Phibro-Tech, Inc. | 8851 Dice Road Santa Fe Springs, CA | (562) 698-8036 | Hazardous and Non-Hazardous Liquids and Solids |
| Romic Environmental Technologies Corporation | 2081 Bay Road East Palo Alto, CA | (650) 324-1638 | Hazardous and Non-Hazardous Liquids |
| Seaport Environmental | 700 Seaport Boulevard Redwood City, CA | (650) 364-8154 | Non-Hazardous Liquids |
| Southwest Treatment Systems, Inc. | 4120 Bandini Boulevard Los Angeles, CA | (800) 900-3366 | Non-Hazardous Liquids |
| US Filter Recovery Services, Inc. | 5375 S. Boyle Avenue Vernon, CA | (323) 277-1495 | Hazardous and Non-Hazardous Liquids and Solids |
| Waste Management Kettleman City | 35251 Old Skyline Road Kettleman City, CA | (559) 386 - 6104 | Hazardous and Non-Hazardous Liquids and Solids |

If the Contractor disposes of PCC pavement grooving and grinding residues at locations not listed above, the disposal shall be in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, and the following:

1. If the disposal facility is located within the State of California, the facility must be permitted by the RWQCB or other applicable agency, or the Contractor must obtain written approval from the RWQCB or other applicable agency.
2. If located outside of the State of California, the facility must be permitted by the applicable local, state, or federal agencies, or the Contractor must obtain written approval from the applicable local, state, or federal agencies.

The following shall be delivered to the Engineer at least 5 days before disposal of PCC pavement grooving and grinding residues:

1. The name, address, and telephone number of the disposal facility.
2. If the facility is not listed above:
   A. Copy of the facility's RWQCB or other applicable agency permit, or
   B. RWQCB's or other applicable agency's approval, or
   C. Copy of the applicable agency permit if the final disposal location is located outside of the State of California.

The Contractor shall deliver landfill receipts and weight ticket of disposal of residues from PCC pavement grooving and grinding to the Engineer within 5 days of completing of PCC pavement grooving and grinding activities.

The Contractor shall make all arrangements and agreements for the disposal at the time of bidding. Costs related to obtaining approval for disposal within the State of California from the RWQCB or other applicable agency, or the applicable agency if the disposal location is located outside of the State of California, shall be borne by the Contractor and no additional payment shall be made therefore. Full compensation for all costs involved in disposing of PCC pavement grooving or grinding residues as specified in this section, including all costs of handling, temporary storage, hauling and disposal fees, shall be considered as included in the price paid for the contract item of work involving PCC pavement grooving or grinding residues and no additional compensation will be allowed therefor.

## 10-1.28 STRUCTURE APPROACH SLABS (TYPE R)

Structure approach slabs (Type R) shall consist of removing portions of existing structures, existing pavement and base including reinforced concrete approach slabs, portland cement concrete pavement, subsealing material, and cement treated base and constructing new reinforced concrete approach slabs at structure approaches as shown on the plans and in conformance with these special provisions.

### GENERAL

The thickness shown on the plans for structure approach slabs is the minimum thickness. The thickness will vary depending on the thickness of the pavement and base materials removed.

Where pavement subsealing has been performed under existing approach slabs, the subsealing material shall be removed for its full depth. Where removal of cement treated base is required to construct the approach slab, the entire thickness of the cement treated base shall be removed.

Voids between the new reinforced structure approach slab and the base material remaining in place that are caused by removal of subsealing material or cement treated base shall be filled, at the option of the Contractor, with aggregate base (approach slab) or structure approach slab concrete.

The Contractor shall establish a grade line for new approach slabs which shall provide a smooth profile grade. The profile grade will be subject to the approval of the Engineer.

The Contractor shall schedule his operations so that the pavement and base materials removed during a work period shall be replaced, in that same work period, with approach slab concrete that shall be cured for at least 4 hours prior to the time the lane is to be opened to public traffic as designated in "Maintaining Traffic" of these special provisions. In the event the existing pavement and base materials are removed and the Contractor is unable to construct, finish, and cure the new approach slab by the time the lane is to be opened to public traffic, the excavation shall be filled with a temporary roadway structural section as specified in this section, "Structure Approach Slabs (Type R)."

### TEMPORARY ROADWAY STRUCTURAL SECTION

A standby quantity of asphalt concrete and aggregate base, equal to the quantity of pavement removed during the work shift, shall be provided at the project site for construction of a temporary roadway structural section where existing approaches to structures are being replaced. The temporary structural section shall be maintained and later removed as a first order of work when the Contractor is able to construct and cure the approach slab within the prescribed time limit. The temporary structural section shall consist of 90-mm thick layer of asphalt concrete over aggregate base.

The aggregate base for the temporary structural section shall conform to the requirements specified under "Aggregate Base (Approach Slab)" of these special provisions.

The asphalt concrete for the temporary structural section shall be produced from commercial quality aggregates and asphalt binder. The grading of the aggregate shall conform to the 19-mm maximum medium grading in Section 39-2.02, "Aggregate," of the Standard Specifications and the asphalt binder shall conform to the requirements of liquid asphalt SC-800 in Section 93, "Liquid Asphalts," of the Standard Specifications. The amount of asphalt binder to be mixed with the aggregate shall be approximately 0.3-percent less than the optimum bitumen content as determined by California Test 367.

Aggregate base and asphalt concrete for the temporary structural section shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material and a surfacing of uniform smoothness, texture, and density. The aggregate base and the asphalt concrete may each be spread and compacted in one layer. The finished surface of the asphalt concrete shall not vary more than 15 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline and shall match the elevation of the existing concrete pavement and structure along the joints between the existing pavement and structure and the temporary surfacing.

The material from the removed temporary structural section shall be disposed of in conformance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications except that removed aggregate base may be stockpiled at the project site and reused for construction of another temporary structural section. When no longer required, standby material or stockpiled material for construction of temporary structural sections shall be removed and disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

**REMOVING PORTIONS OF EXISTING STRUCTURES**

Attention is directed to "Existing Highway Facilities" of these special provisions.

**REMOVING EXISTING PAVEMENT AND BASE MATERIALS**

The outline of portland cement concrete to be removed shall be sawed full depth with a power-driven concrete saw.

The outlines of excavations in asphalt concrete shall be cut on a neat line to a minimum depth of 75 mm with a power-driven concrete saw or wheel-type rock cutting excavator before any asphalt concrete material is removed. These excavations shall be permanently or temporarily backfilled to conform to the grade of the adjacent pavement prior to opening the lane to public traffic. Surplus excavated material may be used as temporary backfill material.

Regardless of the type of equipment used to remove concrete within the sawed outline, the surface of the concrete to be removed shall not be impacted within 0.5-m of the pavement to remain in place. Removing existing pavement and base materials shall be performed without damage to the adjacent structure or pavement that is to remain in place. Damage to the structure or to the pavement that is to remain in place shall be repaired in conformance with the provisions in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Materials removed shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The base material remaining in-place, after removing the existing pavement and base materials to the required depth, shall be graded uniformly, watered, and compacted. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer.

Areas of the base material that are low as a result of over excavation shall be filled, at the Contractor's expense, with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

**AGGREGATE BASE (APPROACH SLAB)**

The aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be produced from commercial quality aggregates consisting of broken stone, crushed gravel or natural rough-surfaced gravel, and sand, or any combination thereof. The grading of the aggregate base shall conform to the 19-mm maximum grading specified in Section 26-1.02A, "Class 2 Aggregate Base," of the Standard Specifications.

Aggregate base (approach slab) for filling voids below the reinforced structure approach slab concrete shall be spread and compacted by methods that will produce a well-compacted, uniform base, free from pockets of coarse or fine material. The aggregate base shall be watered and compacted to the grade approved by the Engineer. Where the required thickness of aggregate base is 200 mm or less, the base may be spread and compacted in one layer. Where the required thickness of aggregate base is more than 200 mm, the base shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 200 mm. The finished surface of the base material at any point shall not extend above the grade approved by the Engineer. Areas of the base material that are lower than the grade approved by the Engineer, shall be filled with structure approach slab concrete at the time and in the same operation that the new concrete is placed.

**STRUCTURE APPROACH SLAB**

Reinforced concrete approach slabs shall conform to the provisions for approach slabs in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Concrete for use in approach slabs shall contain not less than 400 kg of cementitious material per cubic meter.

Steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Bar reinforcement shall be epoxy-coated and shall conform to the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement" of the Standard Specifications.

Approach slab concrete that requires a minimum curing period of 4 hours shall be constructed using a non-chloride Type C chemical admixture. Mineral admixture will not be required in this concrete.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not contract in air more than 0.053-percent.

The non-chloride Type C chemical admixture shall be approved by the Engineer and shall conform to the requirements in ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in conformance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

A. Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 21 ± 1.5°C until the cylinders are tested.
B. The 4-hour average strength of the 5 test cylinders shall not be less than 5.85 MPa. No more than 2 test cylinders shall have a strength of less than 5.5 MPa.

Building paper shall be commercial quality No. 30 asphalt felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be commercial quality.

Bar reinforcement or abutment tie rods in drilled holes shall be bonded in conformance with the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications.

If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. The finished top surface shall not vary more than 6 mm from the lower edge of a 3.6-m straightedge placed parallel with the centerline. Edges of slabs shall be edger finished.

The surface of the approach slab will not be profiled and the Profile Index requirements shall not apply.

Approach slabs shall be cured with pigmented curing compound (1) in conformance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. The minimum curing period as specified herein shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab. Fogging of the surface with water after the curing compound has been applied will not be required. Should the film of curing compound be damaged from any cause before the approach slab is opened to public traffic, the damaged portion shall be repaired immediately with additional compound, at the Contractor's expense. Damage to the curing compound after the approach slab is opened to public traffic shall not be repaired.

If the ambient temperature is below 18°C during the curing period, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket:

| Temperature range during curing period | R-value, minimum |
|---|---|
| 13°C to 18°C | 1 |
| 7°C to 13°C | 2 |
| 4°C to 7°C | 3 |

Tests to determine the coefficient of friction of the final textured surface will be made only if the Engineer determines by visual inspection that the final texturing may not have produced a surface having the specified coefficient of friction. Tests to determine the coefficient of friction will be made after the approach slab is opened to public traffic, but not later than 5 days after concrete placement. The coefficient of friction will be measured by California Test 342. Portions of completed concrete surfaces that are found to have a coefficient of friction less than 0.35 shall be ground or grooved parallel to the center line in conformance with the provisions for bridge decks in Section 42, "Groove and Grind Pavement," of the Standard Specifications.

**JOINTS**

Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

**MEASUREMENT AND PAYMENT**

Structural concrete, approach slab (Type R) will be measured and paid for in conformance with the provisions in Section 51-1.22, "Measurement," and Section 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for removing and disposing of portions of existing structures and pavement materials, and for furnishing and placing miscellaneous metal, epoxy-coated materials, Type AL joint seals, and pourable seals shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

The quantity of aggregate base (approach slab) to be paid for shall include the actual volume of aggregate base (approach slab) used to fill voids below the reinforced structure approach slab concrete, except for the volume of areas low as a result of over excavation. The volume to be paid for will be calculated on the basis of the constructed length, width, and thickness of the filled voids. Structure approach slab concrete used to fill voids lower than the approved grade of the base, except for the areas low as a result of over excavation by the Contractor, will be measured and paid for by the cubic meter as aggregate base (approach slab).

The contract price paid per cubic meter for aggregate base (approach slab) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing aggregate base (approach slab), complete in place, including excavation and removing and disposing of base and subsealing materials, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for furnishing, stockpiling, and disposing of standby material for construction of temporary structural sections; and for constructing, maintaining, removing, and disposing of temporary structural sections shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

Full compensation for drilling and bonding of bar reinforcement or abutment tie rods shall be considered as included in the contract price paid per cubic meter for structural concrete, approach slab (Type R) and no separate payment will be made therefor.

**10-1.29 PAVING NOTCH EXTENSION**

This work shall consist of extending existing paving notches in conformance with the details shown on the plans and these special provisions.

Concrete for paving notch extension shall be a high-strength material consisting of either magnesium phosphate concrete, modified high alumina based concrete, or portland cement based concrete. Magnesium phosphate concrete shall conform to the provisions for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions. Modified high alumina based concrete and portland cement based concrete shall be water activated and shall conform to the provisions for single component (water activated) magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

At least one hour shall elapse between the time of placing concrete for the paving notch extension and placing concrete for the structure approach slab.

A clean uniform rounded aggregate filler may be used to extend the concrete. The moisture content of the aggregate shall not exceed 0.5-percent. Grading of the aggregate shall conform to the following:

| Sieve Sizes | Percentage Passing |
|---|---|
| 12.5-mm | 100 |
| 1.18-mm | 0-5 |

The amount of aggregate filler shall conform to the manufacturer's recommendation, but in no case shall the concrete strengths be less than that specified for magnesium phosphate concrete in Section 83-2.02D(1), "General," of the Standard Specifications.

The components of dual component (with a prepackaged liquid activator) magnesium phosphate shall be combined by mixing complete units supplied by the manufacturer. Portions of units shall not be used. Water shall not be added to dual component magnesium phosphate.

Magnesium phosphate concrete shall not be mixed in containers or worked with tools containing zinc, cadmium, aluminum or copper. Modified high alumina based concrete shall not be mixed in containers or worked with tools containing aluminum.

Concrete shall not be retempered. Finishing tools that are cleaned with water shall be thoroughly dried before working the concrete.

When placing concrete on slopes exceeding 5 percent, the Engineer may require the Contractor to provide a flow controlled modified material.

Modified high alumina based concrete and portland cement based concrete shall be cured in conformance with the provisions in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications. Magnesium phosphate concrete shall not be cured.

The surface temperature of the areas to receive the concrete shall be 5°C or above when the concrete is placed. The contact surface to receive the magnesium phosphate concrete shall be dry. The contact surfaces to receive the modified high alumina concrete or portland cement based concrete may be damp but not saturated.

The construction joint between the paving notch extension and the existing abutment shall conform to the provisions for horizontal construction joints in Section 51-1.13, "Bonding," of the Standard Specifications. Concrete shall be placed in the spalled portions of the existing paving notch concurrently with the concrete for the paving notch extension.

Attention is directed to "Reinforcement" of these special provisions.

Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications, except for payment.

Drilling of holes and bonding of reinforcing steel dowels shall conform to the provisions for drilling and bonding dowels in Section 83-2.02D(1), "General," of the Standard Specifications. If reinforcement is encountered during drilling before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

The quantity of concrete for paving notch extension will be measured by the cubic meter as determined in conformance with the dimensions shown on the plans or other dimensions that may be ordered in writing by the Engineer.

The contract price paid per cubic meter for paving notch extension shall include full compensation for furnishing all labor, materials (including concrete for the paving notch spalled areas), tools, equipment, and incidentals, and for doing all the work involved in constructing the paving notch extension, complete in place, including structure excavation and backfill, reinforcement, and drilling and bonding dowels, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### 10-1.30 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

Where polyurethane seals are shown on the plans, a silicone sealant conforming to the provisions in Section 51–1.12F, "Sealed Joints," of the Standard Specifications may be used.

When ordered by the Engineer, a joint seal larger than called for by the Movement Rating shown on the plans shall be furnished and installed. Payment to the Contractor for furnishing the larger seal and for saw cutting the increment of additional depth of groove required will be determined as provided in Section 4-1.03, "Changes," of the Standard Specifications.

Saw cutting of grooves will not be required at existing joints that are to be sealed with Type A joint seal unless ordered by the Engineer. The Contractor shall make saw cuts as ordered by the Engineer and the saw cutting will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

### 10-1.31 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

The Department's mechanical splices prequalified list can be found at the following internet site:

http://www.dot.ca.gov/hq/esc/approved_products_list/

The provisions of "Welding Quality Control" of these special provisions shall not apply to resistance butt welding.

### 10-1.32 FURNISH SIGN

Roadside signs shall be fabricated and furnished in accordance with details shown on the plans, the Traffic Sign Specifications, and these special provisions.

For sign panels that have a minor dimension of 1220 mm or less, no splice will be allowed in the retroreflective sheet except for the splice produced during the manufacturing of the retroreflective sheeting. For sign panels that have a minor dimension greater than 1220 mm, only one horizontal splice will be allowed in the retroreflective sheeting.

The face of each finished sign shall be uniform, flat, smooth, and free of defects, scratches, wrinkles, gel, hard spots, streaks, extrusion marks, and air bubbles. The finished signs shall also be free from blemishes that may affect the serviceability and detract from the general sign color and appearance when viewing during daytime and nighttime from a

distance of 8 m. The front, back, and edges of the sign panels shall be free of router chatter marks, burns, sharp edges, loose rivets, delaminated skins, excessive adhesive over spray and aluminum marks.

**SHEET ALUMINUM**

Alloy and temper designations for sheet aluminum shall be in accordance with ASTM Designation: B209.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the sheet aluminum.

Sheet aluminum shall be pretreated in accordance to ASTM Designation: B449. Surface of the sheet aluminum shall be cleaned, deoxidized, and coated with a light and tightly adherent chromate conversion coating free of powdery residue. The conversion coating shall be Class 2 with a mass between 108 $mg/m^2$ and 377 $mg/m^2$, and an average mass of 269 $mg/m^2$. Following the cleaning and coating process, the sheet aluminum shall be protected from exposure to grease, oils, dust, and contaminants.

Sheet aluminum shall be free of buckles, warps, dents, cockles, burrs, and defects resulting from fabrication.

Base plate for standard route marker shall be die cut.

**RETROREFLECTIVE SHEETING**

The Contractor shall furnish retroreflective sheeting for sign background and legend in accordance with ASTM Designation: D4956 and "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Retroreflective sheeting shall be applied to sign panels as recommended by the retroreflective sheeting manufacturer without stretching, tearing, and damage.

Class 1, 3, or 4 adhesive backing shall be used for Type II, III, IV, VII, VIII, and IX retroreflective sheeting. Class 2 adhesive backing may also be used for Type II retroreflective sheeting. The adhesive backing shall be pressure sensitive and fungus resistant.

When the color of the retroreflective sheeting determined from instrumental testing is in dispute, the Engineer's visual test will govern.

**PROCESS COLOR AND FILM**

The Contractor shall furnish and apply screened process color, non-reflective opaque black film, and protective overlay film of the type, kind, and product that are approved by the manufacturer of the retroreflective sheeting.

The Contractor shall furnish the Engineer a Certificate of Compliance in accordance to Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for the screened process color, non-reflective opaque black film, and protective overlay film.

The surface of the screened process color shall be flat and smooth. When the screened process colors determined from the instrumental testing in accordance to ASTM Designation: D4956 are in dispute, the Engineer's visual test will govern.

The Contractor shall provide patterns, layouts, and set-ups necessary for the screened process.

The Contractor may use green, red, blue, and brown reverse-screened process colors for background and non-reflective opaque black film or black screened process color for legend. The coefficient of retroreflection for reverse-screened process colors on white retroreflective sheeting shall not be less than 70 percent of the coefficient of retroreflection specified in ASTM Designation: D4956.

The screened process colors and non-reflective opaque black film shall have the same outdoor weatherability as that of the retroreflective sheeting.

After curing, screened process colors shall withstand removal when tested by applying 3M Company Scotch Brand Cellophane Tape No. 600 or equivalent tape over the color and removing with one quick motion at 90°angle.

**SINGLE SHEET ALUMINUM SIGN**

Single Sheet aluminum signs shall be fabricated and furnished with or without frame. The Contractor shall furnish the sheet aluminum in accordance to "Sheet Aluminum" of these special provisions. Single sheet aluminum signs shall be fabricated from sheet aluminum alloy 6061-T6 or 5052-H38.

Single Sheet aluminum signs shall not have a vertical splice in the sheet aluminum. For signs with depth greater than 1220 mm, one horizontal splice will be allowed in the sheet aluminum.

Framing for single sheet aluminum signs shall consist of aluminum channel or rectangular aluminum tubing. The framing shall have a length tolerance of +3 mm. The face sheet shall be affixed to the frame with rivets of 5-mm diameter. Rivets shall be placed within the web of channels and shall not be placed less than 13 mm from edges of the sign panels. Rivets shall be made of aluminum alloy 5052 and shall be anodized or treated with conversion coating to prevent corrosion. The exposed portion of rivets on the face of signs shall be the same color as the background or legend where the rivets are placed.

Finished signs shall be flat within a tolerance of +3 mm per meter when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within +3 mm of the detailed dimensions.

Aluminum channels or rectangular aluminum tubings shall be welded together with the inert gas shielded-arc welding process using E4043 aluminum electrode filler wires as shown on the plans. Width of the filler shall be equal to wall thickness of smallest welded channel or tubing.

**FIBERGLASS REINFORCED PLASTIC PANEL SIGN**

The Contractor shall furnish fiberglass reinforced plastic panel signs in accordance with ASTM Designation: D3841 and "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Fiberglass reinforced plastic shall be acrylic modified and ultraviolet stabilized for outdoor weatherability. The plastic shall contain additives designed to suppress fire ignition and flame propagation. When tested in accordance with the requirements in the ASTM Designation: D635, the extent of burning shall not exceed 25 mm.

Fiberglass reinforced plastic shall be stabilized to prevent the release solvents and monomers. The front and back surfaces of the laminate shall be clean and free of constituents and releasing agents that can interfere with the bonding of retroreflective sheeting.

The fiberglass reinforced plastic panel signs shall be weather resistant Grade II thermoset polyester laminate.

The fiberglass reinforced plastic panels shall be minimum 3.4 mm thick. Finished fiberglass reinforced plastic panel signs shall be flat within a tolerance of +3 mm per meter when measured across the plane of the sign in all directions. The finished signs shall have an overall tolerance within +3 mm of the specified dimensions.

Color of fiberglass reinforced plastic panels shall be uniform gray within Munsel range of N7.5 to N8.5.

Fiberglass reinforced plastic panels shall be cut from a single piece of laminate. Bolt holes shall be predrilled. The predrilled bolt holes, panel edges, and the front and back surfaces of the panels shall be true and smooth. The panel surfaces shall be free of visible cracks, pinholes, foreign inclusions, warping and wrinkles that can affect performance and serviceability.

**10-1.33 METAL BEAM GUARD RAILING**

Metal beam guard railing and end caps shall be constructed in conformance with the provisions in Section 83-1, "Railings," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" of these special provisions.

Line posts shall be wood. Blocks shall be wood.

**ALTERNATIVE IN-LINE TERMINAL SYSTEM**

Alternative in-line terminal system shall be furnished and installed as shown on the plans and in conformance with these special provisions.

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

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

(2) TERMINAL SYSTEM (TYPE ET) - Terminal system (Type ET) shall be an ET-2000 PLUS (4-tube system) extruder terminal as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type ET) shown on the plans. The ET-2000 PLUS (4-tube system) extruder terminal can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772–7976.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems furnished conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Terminal systems shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each terminal system installed shall be identified by painting the type of terminal system in neat black letters and figures 60 mm high on the backside of the rail element between system posts numbers 4 and 5.

For terminal system (Type ET) the steel foundation tubes with soil plates attached shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. The wood terminal posts shall be inserted into the steel foundation tubes by hand and shall not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For terminal system (Type SKT) the soil tubes shall be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for alternative in-line terminal system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing alternative in-line terminal system, complete in place, including excavation, backfill and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

**ALTERNATIVE FLARED TERMINAL SYSTEM**

Alternative flared terminal system shall be furnished and installed as shown on the plans and in conformance with these special provisions.

The allowable alternatives for a flared terminal system shall consist of one of the following or a Department approved equal.

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

(2) TERMINAL SYSTEM (TYPE SRT) - Terminal system (Type SRT) shall be an SRT-350 Slotted Rail Terminal (8-post system) as manufactured by Trinity Industries, Inc., and shall include items detailed for terminal system (Type SRT) shown on the plans. The SRT-350 Slotted Rail Terminal (8-post system) can be obtained from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone (800) 772–7976.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems furnished conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

Terminal systems shall be installed in conformance with the manufacturer's installation instructions and these requirements. Each terminal system installed shall be identified by painting the type of terminal system in neat black letters and figures 60 mm high on the backside of the rail element between system posts numbers 4 and 5.

For terminal system (Type SRT), the steel foundation tubes with soil plates attached shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. The wood terminal posts shall be inserted into the steel foundation tubes by hand and shall not be driven. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

For terminal system (Type FLEAT), the soil tubes shall be, at the Contractor's option, driven with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 100 mm thick and each layer shall be moistened and thoroughly compacted. Wood posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel

foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 65°C or less. The edges of the wood posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system has been installed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for alternative flared terminal system shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing alternative flared terminal system, complete in place, including excavation, backfill and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### 10-1.34 TRANSITION RAILING (TYPE WB)

Transition railing (Type WB) shall be furnished and installed in conformance with details shown on the plans, the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The 10-gage rail elements shall conform to the requirements of Class B, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180. End caps shall conform to the requirements of Class A, Type 1 thrie beam guard railing as shown in AASHTO Designation: M 180.

Surplus excavated material remaining after the transitional railing (Type WB) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

The contract unit price paid for transition railing (Type WB) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing transition railing (Type WB), complete in place, including drilling holes for wood posts, driving posts, backfill, and disposal of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

### 10-1.35 THERMOPLASTIC TRAFFIC STRIPE

Thermoplastic traffic stripes (traffic lines) shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

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

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

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic traffic stripes shall be applied at the minimum thickness and application rate as specified below. The minimum application rate is based on a solid stripe of 100 mm in width.

| Minimum StripeThickness (mm) | Minimum Application Rate (kg/m) |
|---|---|
| 2.5 | 0.5 |

Thermoplastic traffic stripes shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

At the option of the Contractor, permanent traffic striping tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the thermoplastic traffic stripes specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications.

If permanent tape is placed instead of thermoplastic traffic stripes, the tape will be measured and paid for by the meter as thermoplastic traffic stripe.

### 10-1.36 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

The Contractor shall furnish the Engineer certificates of compliance for the pavement markers in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Retroreflective pavement markers shall be marked as abrasion resistant on the body of the markers.

## SECTION 10-2. (BLANK)

## SECTION 10-3. SIGNALS, LIGHTING AND ELECTRICAL SYSTEMS

### 10-3.01 DESCRIPTION

Modifying ramp metering systems, traffic monitoring stations (count) and communication system routing shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

### 10-3.02 ABBREVIATIONS AND GLOSSARY

The following Abbreviations and Glossary apply to Section 10-3 of these special provisions.

**Abbreviations:**

| | |
|---|---|
| & | And |
| # | number |
| ADM: | Add Drop Multiplexer. |
| AFC: | Automated Frequency Control. |
| AGC: | Automatic gain control. |
| AIS: | Alarm Indication Signal. |
| AISI: | American Iron and Steel Institute. |
| AMI: | Alternate Mark Inversion (a data transmission protocol.) |
| APD: | Avalanche Photo diode. |
| APL: | Average picture level. |
| APS: | Automatic Protection Switch. |
| AVC | Automatic vehicle classification system |
| AWG | American wire gauge |
| AWM: | Appliance Wiring Material. |
| B8ZS: | Bipolar 8 Zero Suppression(data transmission protocol) |
| BER: | Bit error rate. |
| BERTS: | Bit Error Rate Test Set. |
| BITS: | Building Integrated Timing Supply. |
| BNC: | Bayonet Navy Connector. |
| Bps: | Bits per second. |
| BPV: | Bipolar Violation. |
| CCD: | Charge-Coupled Device. |
| CCK: | Camera Control Key pad. |
| CCR: | Camera Control Receiver |
| CCT: | Camera Control Transmitter. |
| CCTV: | Closed Circuit Television. |
| NTR: | Code of Federal Regulations. |
| CIDH: | Cast In Drilled Hole. |
| CMIP: | Configuration Management Information Protocol. |
| CMISE: | Common Management Information Service Entity. |
| CMP: | Configuration Management Plan. |
| CMS: | Changeable Message Sign. |
| CODEC: | Coder - Decoder. |
| COMM | Communication |
| CPU: | Central Processing Unit. |
| CRT: | Cathode Ray Tube. |
| CTRL | Controller |
| DACCS | Digital access and cross connection system |
| D4: | 4th version of the D-signal format for time division multiplexers. |

| | |
|---|---|
| DB: | Decibel. |
| DBm: | Decibel referred to milliwatt. |
| DBrn: | Decibel above reference noise. |
| DCD: | Data carrier detect |
| DCE: | Data communication equipment. |
| DTE: | Data Circuit Terminating Equipment. |
| DEMARC | Demarcation |
| DEMUX | Demultiplexer |
| DCS: | Digital Cross-Connect System. |
| DS-1: | Digital Signal Level 1. Digital Transmission Rate - 1.544 megabits per second. |
| DS-3: | Digital Signal Level 3. Digital Transmission Rate - 44.876 megabits per second. |
| DWP: | LA Dept. of Water and Power |
| EIA: | Electronics Industries Association. |
| EMT: | Electrical Metallic Tubing. |
| ESF: | Extended Superframe or Extended Superframe Format (4). |
| E/O | east of |
| FCC | Federal Communications Commission |
| F/O or FO: | Fiber optic. |
| FDF | Fiber Distribution Frame |
| FDU: | Fiber Distribution Unit. |
| FRP: | Fiberglass Reinforced Plastic. |
| FXS: | Foreign Exchange Subscriber. |
| GFCI: | Ground Fault Circuit Interrupter. |
| GUI | Graphical User Interface. |
| HAR: | Highway Advisory Radio. |
| HVAC: | Heating Ventilation and Air Conditioning. |
| Hz: | Hertz. |
| IRE: | IRE is a SMPTE Standard video reference level. |
| ITUR | International Telecommunications Union Radio |
| JKFD: | Jackfield |
| KP | Kilometer Post |
| LA | Los Angeles |
| M13: | Multiplexer, 28 DS-1 circuits to 1 DS-3 circuit. |
| MHz: | Megahertz. |
| MMFO: | Multimode fiber optics |
| MUX: | Multiplexer |
| NEMA: | National Electrical Manufacturers Association. |
| NHD | North Hollywood |
| Nm: | nanometer. |
| NMS: | Network Management System. |
| NRZ: | Non-return to Zero. |
| NTSC: | National Television Standards Committee. |
| OC: | Optical Channel. |
| OD: | Outside Diameter. |
| OEM | Original Equipment Manufacturer. |
| OSHA: | Occupational Safety and Health Administration. |
| OW | Order wire (Multiple voice circuit) |
| P | Pair |
| P22 | Pair 22 American Wire Gauge |

| | |
|---|---|
| PAC BELL | Pacific Bell telephone Company |
| p-p: | Peak to Peak. |
| PC: | Personal Computer. |
| PCMS: | Pasadena City Municipal Services or Portable Changeable Message Sign |
| PDA | Power distribution assembly |
| PIN: | P-type, intrinsic, N-type. |
| PM: | Post Mile |
| PR | Pair |
| PRBS: | Pseudo-Random Bit Sequence pattern. |
| QRSS: | Quasi-Random Signal Source. |
| REA: | United States Rural Electrification Administration. |
| RETMA: | Radio-Electronics-Television Manufacturers Association (Former name of EIA.) |
| RF: | Radio Frequency. |
| RG: | Regulatory Guide. |
| RMS: | Ramp Metering System. |
| Rms: | Root-mean-square. |
| RTS: | Request to send. |
| SF: | Superframe Format (D4). |
| SM: | Singlemode. |
| SMFO: | Singlemode Fiber Optic. |
| SONET: | Synchronous Optical Network. |
| SSOVP: | Solid State Over-voltage Protector. |
| SSPC: | Steel Structures Painting Council. |
| ST: | Type of Connector. |
| TDM: | Time Division Multiplexer. |
| THHN: | Heat Resistant thermoplastic with Nylon Jacket Conductor. |
| THWN: | Moisture and Heat Resistant Thermoplastic with Nylon Jacket Conductor. |
| TIA: | Telecommunications Industries Association. |
| TL-1: | Transaction Language 1. |
| TLP: | Transmission Level Point. |
| TOSNET: | Traffic Operational System Network |
| TMC: | Traffic Management Center. |
| TSG: | Test Signal Generator. |
| TSI: | Time Slot Interchange. |
| UNC: | Unified National Coarse. |
| UNIX: | Specific operating system found in real-time applications. |
| UV: | Ultraviolet. |
| V: | Volt. |
| V(ac) | V, Alternating Current. |
| V(dc) | V, Direct current |
| VID: | Video Identification and Date/Time Display. |
| VSK: | Video switch keypad. |
| VSM: | Video switch matrix. |
| VT-1.5: | Virtual Tributary-Level 1.5 (1.728 Mb/s.). |
| VT: | Virtual Tributary. |
| W: | Watt. |
| WFM: | Waveform Monitor. |
| WTO: | Wire Transit Only. |

| | |
|---|---|
| X.11, X.25: | specific protocol standards generated by the International Telecommunications Union (formerly CCITT.) |
| XHHW: | Moisture and Heat Resistant Cross Linked Synthetic Polymer Conductor. |

**Glossary:**

**Breakout**

Cable "breakout" is produced by removing jackets just beyond the last tie-wrap point, exposing 0.9 m to 1.8 m of cable buffers, Aramid strength yarn and central fiberglass strength members and cutting Aramid yarn, central strength members and buffer tubes to expose individual glass fibers for splicing or connection to the appropriate device.

**Cable Storage Cabinet**

A cabinet for holding excess cable slack, allowing flexibility in equipment location and allowing cable pulling for re-splicing.

**Channel**

An information path between a discrete input and a discrete output. One single input to a multiplexer or output from a demultiplexer.

**Closed Circuit Television Assembly**

Camera, lens, environmental enclosure, and necessary connectors and cables.

**Connector**

A mechanical device providing the means for attaching to and decoupling from a transmitter, receiver or another fiber (such as on a patch panel).

**Connectorized**

A fiber with a connector affixed to it.

**Connector Module Housing (CMH)**

A patch panel used in the FDF to terminate singlemode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.

**Couplers**

Devices normally located within FDF's mounted in panels, that mate 2 fiber optic connectors to facilitate the transition of optical light signals from one connector into another. They may also be used unmounted, to join 3 simplex fiber runs. Couplers may also be referred to as adapters, feed-throughs and barrels.

**Fiber Distribution Frame (FDF)**

A rack mounted system usually installed in the TMC that consists of a standard equipment rack, fiber routing guides, horizontal jumper troughs, fiber distribution units (FDU), connector module housings (CMH) and splice module housings (SMH).

FDF's serves as the "home" for passive fiber optic components from cable breakout, for connection by jumpers, to the electronics.

**Fiber Distribution Unit (FDU)**

An enclosure containing a Connector Module Housing (CMH) and a Splice Module Housing enclosure.

**Field Cabinet**

A roadside cabinet housing controllers or communications equipment.

**Intermediate Distribution Frame Room (IDF room)**

The room or area inside a hub or hut containing the FDF and other distribution hardware.

**Jumper**

A short fiber optic cable with connectors installed on both ends, typically used for connection within an FDF.

**Light Source**

A portable piece of fiber optic test equipment used to perform end-to-end attenuation testing in conjunction with a power meter containing a stabilized light source operating at the designed wavelength of the system under test.

**Link**

A passive section of the system, the ends of which are to be connected to active components. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video Multiplexer (MUX).

**Main Distribution Frame Room (MDF room)**

The room inside the TMC which contains the FDF and other distribution hardware.

**Mux/Demux**

Multiplexer/Demultiplexer.

**Optical Time Domain Reflectometer (OTDR)**

Fiber optic test equipment used to measure total amount of power loss between 2 points and the corresponding distance. It provides a visual and printed display of the relative location of system components such as fiber sections, splices and connectors and as losses attributable to each component or defect in fiber.

**Patchcord**

A short jumper.

**Pigtail**

A short length of fiber optic cable with a connector installed on one end.

**Power Meter**

A portable fiber optic test equipment used to perform end-to-end attenuation testing in conjuction with a light source, containing a detector that is sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of power injected by the light source that arrives at the receiving end of the link.

**Segment**

A section of F/O cable not connected to an active device which may or may not have splices per the design.

**Splice Closure**

An environmentally sealed container used to organize and protect splice trays, normally installed in a splice vault that allows splitting or routing of fiber cables from multiple locations.

**Splice Module Housing (SMH)**

A housing for storage of splice trays, pigtails and short cable lengths.

**Splice Tray**

A container used to organize and protect spliced fibers.

**Splice Vault**

A vault used to house splice closures.

## 10-3.03 COST BREAK-DOWN

Cost break-downs shall conform to the provisions in Section 86-1.03, "Cost Break-Down," of the Standard Specifications and these special provisions.

The Engineer shall be furnished a cost break-down for each contract lump sum item of work described in this Section 10-3.

The cost break-down shall be submitted to the Engineer for approval within 15 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

The cost breakdown shall include the following items in addition to those listed in the Standard Specifications:

A. Fiber optic cable splice closures – each type
B. Fiber optic cables – each type
C. Fiber distribution units – each type

## 10-3.04 EQUIPMENT LIST AND DRAWINGS

## 10-3.05 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Attention is directed to Section 7-1.11, "Preservation of Property", of the Standard Specifications and these special provisions.

### RESTRICTIONS OF EXISTING RAMP METERING SYSTEM

Except as otherwise provided in these special provisions, or as directed by the Engineer, electrical system for existing ramp metering system and traffic monitoring station (counts), shall be subjected to the following restrictions:

A. Ramp metering system and traffic monitoring station controllers shall not be disconnected or disrupted between the hours of 6:00 a.m. and 9:00 a.m., and from 3:00 p.m. to 7:00 p.m., Monday through Friday.
B. Ramp metering system and traffic monitoring stations shall not be disconnected from its electrical power for more than 15 minutes in any 24-hour period without prior written approval from the Engineer.

The Contractor shall obtain written approval from the Engineer at least 72 hours prior to system cut over, disconnection or disruption of service from existing ramp metering system and traffic monitoring station (counts).

### MAINTAINING EXISTING COMMUNICATION SYSTEM ROUTING

#### General

Elements of existing communication system routing located within the project limits may conflict with construction operations and shall remain in place and be protected from damage. In areas where excavation operations are performed, the Contractor shall notify the Engineer a minimum of 72 hours prior to starting work and obtain as-built plans for the area.

The Contractor shall obtain written approval from the Engineer, a minimum of 72 hours prior to system cut-over or disconnection of service from existing individual electrical systems for existing communication system routing elements, including, but not limited to, ramp metering system (RMS), traffic monitoring systems (TMS) and closed circuit television (CCTV) camera systems.

The Contractor shall use hand tools to excavate, relocate, repair, replace and remove existing communication system routing elements and devices. If part of the existing communication system elements is damaged or fails due to the Contractor's operations, the Engineer shall be notified immediately and damaged communication system routing elements shall be repaired or replaced, at the Contractor's expense, within 5 working days. Replaced communication system routing elements shall be new, of equal or better quality than damaged communication system elements.

#### Pre-Construction Check

The Contractor and the Engineer shall jointly conduct a pre-construction check of the existing communication system routing elements.

The Engineer will approve in advance and in writing, replacement methods and replaced facilities; including communication conduit types and bend radius and fusion splicing of fiber optic cables.

If fiber optic cables are damaged due to the Contractor's operations, the Contractor shall install new fiber optic cables from an original splice point to an original splice point, unless otherwise authorized in writing by the Engineer. Fiber optic cable shall be spliced at existing splice vaults.

The amount of new fiber optic cable slack in splice vaults and the number of new fiber optic cable splices shall be the same as original. Fusion splicing will be required.

The Contractor shall demonstrate that repaired or replaced facilities operate in a manner identical to that prior to damage. If the Contractor fails to perform required repairs or replacement work, as determined by the Engineer, the State will perform repair or replacement work and the cost of performing such repairs or replacement work will be deducted from any money due, or to become due the Contractor. Electrically related construction may be suspended, as determined by the Engineer, until repairs and replacement work have been completed.

Full compensation for pre-construction check of existing communication system routing elements shall be considered as included in the contract lump sum price paid for communication system routing (modify) and no additional compensation will be allowed therefor.

## 10-3.06 MODIFY COMMUNICATION SYSTEM ROUTING

### GENERAL

Communication system routing elements consist of, but is not limited to, communication conduits, innerducts, fiber optic cables and fiber optic splice closures.

Modifying communication system routing shall conform to rules and regulations of the Federal Communications Commission (FCC), the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

New equipment shall be current standard production units and shall have been in production for a minimum of 6 months.

As-built plans for existing communication system routing and field elements are available for inspection or copying at the Department of Transportation, Construction Office, 100 South Main Street, Los Angeles California 90012.

The Contractor shall perform work conforming to the provisions in "Order of Work," of these special provisions, as directed by the Engineer, and in the following order:

A. A jointly conducted pre-construction check shall be conducted with the Engineer, conforming to the requirements in "Maintaining Existing Communication System Routing," of these special provisions.
B. The Contractor shall submit an installation and test plan, in accordance with manufacturer's specifications, for approval in advance by the Engineer. The test plan shall verify that existing materials and equipment are operationally functional before construction commences and record the working condition of those materials and equipment.
C. The Contractor shall perform system testing conforming to the requirements in "System Testing for Modify Communication System Routing," and system cut-over work conforming to the requirements in "Communication System Routing Cut-over," of these special provisions.

The Contractor shall arrange, at the Contractor's expense, to have a technician qualified to work on existing communication system routing and field element equipment present at the time the communication system routing and field element equipment is installed, modified or reconnected.

## 10-3.07 CONDUIT

Conduit to be installed underground shall be Type 1 unless otherwise specified. Detector termination conduits shall be Type 1, including runs in elevated concrete slabs, except as shown on the plans.

The conduit in a foundation and between a foundation and the nearest pull box shall be Type 1.

When a standard coupling cannot be used for joining Type 1 conduit, a UL listed threaded union coupling conforming to the provisions in Section 86-2.05C, "Installation," of the Standard Specifications, or a concrete-tight split coupling shall be used.

When conduit is placed in a trench under paved shoulders, after the bedding material is placed and the conduit is installed, the trench shall be back-filled with slurry cement backfill conforming to the requirements in Section 19-3.062 of the Standard Specifications, except the maximum size of aggregate shall be 10 mm (pea gravel), containing not less than 150 kg of portland cement per cubic meter and commercial quality cement sand, to not less than 50 mm above the conduit and to within 30 mm of existing shoulder surface as shown on the plans, before additional backfill material is placed.

Trenches shall be less than or equal to 200 mm width.

The Contractor's attention is directed to "Aerially Deposited Lead" of these special provisions.

Immediately prior to installing conductors, cables and innerducts, all conduits shall be blown out with compressed air until all foreign material is removed.

After conductors have been installed, the ends of conduits terminating in various pull boxes, splice vaults and cabinets shall be sealed with an approved type of sealing compound.

Conduit shall not be installed by trenching along the pavement of freeway lanes except in those section of the highway where there is insufficient clearance to locate a longitudinal trench off the traveled way, or where obstructions off the traveled way would necessitate bends in the conduits in excess of those allowed.

Trenching shall not be allowed across freeway lanes, connectors and ramps.

### COMMUNICATION CONDUIT

Communication conduit shall conform to the provisions in "Conduit" of these special provisions and these special provisions.

Excavation and slurry cement backfill shall conform to Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications.

Conduit shall enter splice vaults through knockouts. Conduit ends shall not extend beyond interior wall of splice vaults. Space around conduits through end walls of splice vaults shall be filled with portland cement mortar conforming to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications. Conduit bodies or communication pull boxes shall not be used in lieu of specified bends to change the direction of communication conduit runs, except where specified.

No bends shall be placed in sections of conduit in excess of those indicated in the plans without the approval of the Engineer. The total degrees of bending in a section of conduit between splice vaults shall not exceed a total of 180 degrees, except where specified otherwise.

Changes in indicated conduit bends may be made to suit field conditions if the change reduces the degree of bend or increases the radius of bend. The angle of the bend shall not be increased without the approval of the Engineer.

Minimum bending radius for size 103 communication conduits shall be 1220 mm. Bends greater than 22 degrees shall be factory bends.

Deflections from indicated communication conduit routing to avoid obstructions shall not exceed 83.3 mm/m. Conduit from typical trench sections shall not deflect by more than 83.3 mm/m from the alignment preceding or following splice vaults.

Where edge drains are in the path of conduit routing, the Contractor shall first locate edge drains, then install conduit maintaining a minimum depth of 460 mm. If an edge drain is damaged by the Contractor's work, repairs shall be at the Contractor's expense.

**Size 32 Innerducts40**

Innerduct shall be installed to provide protection for fiber optic cables. Separate innerducts shall be installed for each fiber optic cable along communication mainlines as shown on the plans.

Innerducts shall be 32 mm, smooth, ribbed or corrugated high tensile polyethylene duct with the following characteristics:

A. Inner diameter greater than or equal to 32 mm, nominal.
B. Environmental stress crack resistance in excess of 2000 hours at -100˚C, no failures.
C. Cold impact resistance to -76˚C not brittle until -100˚C.
D. Minimum tensile strength of 2670 N for finished product.
E. Minimum crush strength of 2900 N.
F. Coefficient of friction less than 0.4 unlubricated on nonmetallic conduit and with common polyethylene cable jackets.

Different innerducts within the same conduit shall be different colors, and shall be consistent throughout the project. Yellow shall be used for the 48SMFO fiber optic cables used for video/data and contrasting colors approved by the Engineer for the 24SMFO for video distribution. Exteriors of innerducts shall be marked with sequential measurement markings each meter.

Innerduct shall be installed using manufacturer's recommended practices. Innerducts shall be installed using cable pulling lubricants recommended by the innerduct manufacturer and non-abrasive pull tapes conforming to the requirements in "Conduit" of these special provisions. If innerduct is installed with adjacent cables in the same conduit, innerducts and cables shall be installed together in one operation. Innerducts shall be installed in continuous runs between the splice vault and the cabinet without splices or joints.

Ends shall be smooth to prevent scraping of cables. Dynamometers shall be used to record installation tensions and tension limiting devices shall be used to prevent exceeding maximum pulling tensions during installation. Breakaway devices shall be used to limit pulling tensions. One device shall be placed in series with every element rated for less than maximum pulling tensions of that element. Innerducts shall not be stressed beyond the minimum-bending radius allowed by the innerduct or fiber optic cable manufacturer.

Tension shall be set to the manufacturer’s maximum limit. Maximum pulling tension shall be recorded for each innerduct run.

Immediately prior to installing cables, innerducts shall be blown out with compressed air until all foreign material is removed. After cables have been installed, ends of innerducts shall be sealed with an approved type of sealing compound.

Full compensation for furnishing and installing size 32 innerducts shall be considered as included in the contract lump sum price paid for communication system routing (modify) and no additional compensation will be allowed therefor.

## 10-3.08 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 1.0 mm for conductor sizes No. 14 to No. 10, inclusive, and 1.3 mm for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.69 mm for conductor sizes No. 14 to No. 10, inclusive, 1.02 mm for No. 8, and 1.37 mm for No. 6 to No. 2, inclusive.

**10-3.09 FIBER OPTIC CABLE**

Fiber optic cable shall conform to the details shown on the plans and these special provisions.

**DEFINITIONS**

The following definitions shall apply to fiber optics:

A. Active Component Link Loss Budget - The difference between average transmitter launch power (in dBm) and receiver maximum sensitivity (in dBm).
B. Backbone - Fiber cable that provides connections between the Transportation Management Center (TMC) and hubs, as well as between equipment rooms or buildings, and between hubs. The term is used interchangeably with "trunk" cable.
C. Connector - A mechanical device used to align and join fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel).
D. Connectorized - The termination point of a fiber after connectors have been affixed.
E. Connector Module Housing (CMH) - A patch panel used to terminate singlemode fibers with most common connector types. It may include a jumper storage shelf and a hinged door.
F. Couplers - Devices which mate fiber optic connectors to facilitate transition of optical light signals from one connector into another. They are normally located within FDUs, mounted in panels. They may also be used unmounted, to join 2 simplex fiber runs.
G. Distribution Cable - Fiber cable that provides connections between hubs. Drop cables are typically spliced into distribution cables.
H. Drop Cable - Fiber cable that provides connections between distribution cables to field elements. Typically these run from splice vaults to splice trays within field cabinets. Drop cables are usually short in length (less than 20 m) and are of the same construction as outside plant cable. "Breakout cable" is used interchangeably with drop cable.
I. End-to-End Loss - The maximum permissible end-to-end system attenuation is the total loss in a given link. This loss could be actual measured loss or calculated using typical (or specified) values. This number will determine the amount of optical power (in dB) needed to meet the System Performance Margin.
J. Fan Out Termination - Permits branching of fibers contained in optical cables into individual cables and can be done at field locations, allowing cables to be connectorized or terminated per system requirements. A kit provides pullout protection for individual bare fibers to support termination. It provides 3 layers of protection consisting of a Teflon inner tube, a dielectric strength member, and an outer protective PVC jacket. Fan out terminations shall not be used for more than 6 fibers. Use of a patch panel would be appropriate.
K. Fiber Distribution Frame (FDF) - A rack mounted system usually installed in hubs or the TMC, that may consist of a standard equipment rack, fiber routing guides, horizontal jumper troughs and Fiber Distribution Units (FDU). FDFs serve as terminations and interconnections of passive fiber optic components for connection by jumpers from cable breakouts to equipment.
L. Fiber Distribution Unit (FDU) - An enclosure or rack mountable unit containing a patch panel with couplers and splice trays. The units patch panel and splice trays may be integrated or separated by a partition.
M. F/O - Fiber optic.
N. FOIP - Fiber optic inside plant cable.
O. FOOP - Fiber optic outside plant cable.
P. FOTP - Fiber optic test procedures as defined by TIA/EIA standards.
Q. Jumper - A short cable, typically one meter or less, with connectors on each end, used to join 2 CMH couplers or a CMH to active electronic components.
R. Light Source - Portable fiber optic test equipment used to perform end-to-end attenuation testing when coupled with a power meter. It contains a stabilized light source operating at the wavelength of the system under test.
S. Link - A passive section of the system with connectorized ends. A link may include splices and couplers. For example, a video link may be from a F/O transmitter to a video multiplexer (VMX).
T. Loose Tube Cable - Type of cable construction in which fibers are placed in buffer tubes to isolate them from outside forces (stress). A flooding compound or material is applied to the interstitial cable core to prevent water migration and penetration. This type of cable is primarily for outdoor applications.
U. Mid-span Access Method - A procedure in which fibers from a single buffer tube are accessed and spliced to an adjoining cable without cutting unused fibers in buffer tubes, or disturbing remaining buffer tubes in cables.

V. MMFO - Multimode Fiber Optic Cable.
W. Optical Time Domain Reflectometer (OTDR) - Fiber optic test equipment used to measure total power loss in a F/O cable between 2 points that provides a visual and printed display of losses associated with system components such as fiber, splices, and connectors.
X. Optical Attenuator - An optical element that reduces the intensity of a signal passing through it.
Y. Patchcord - A term used interchangeably with "jumper".
Z. Patch Panel - A precision drilled metal frame containing couplers used to mate 2 fiber optic connectors.
AA. Pigtail - A short optical fiber permanently attached to a source, detector, or other fiber optic device.
AB. Power Meter - Portable fiber optic test equipment used to perform end-to-end attenuation testing when coupled with a light source. It contains a detector sensitive to light at the designed wavelength of the system under test. Its display indicates the amount of optical power being received at the end of the link.
AC. Riser Cable - NEC approved cable installed in a riser (a vertical shaft in a building connecting floors).
AD. Segment - A section of F/O cable not connected to a device and may or may not have splices.
AE. SMFO - Singlemode Fiber Optic Cable.
AF. Splice - The permanent joining of 2 fiber ends using a fusion splicer.
AG. Splice Closure - An environmentally sealed container used to organize and protect splice trays. The container allows splitting or routing of fiber cables from multiple locations. Normally installed in a splice vault.
AH. Splice Module Housing (SMH) - A unit that stores splice trays, pigtails and short cable lengths. The unit allows splitting or routing of fiber cables to or from multiple locations.
AI. Splice Tray - A container used to organize and protect spliced fibers.
AJ. Splice Vault - An underground container used to house excess cable or splice closures.
AK. System Performance Margin - A calculation of the overall "End to End" permissible attenuation from the fiber optic transmitter (source) to the fiber optic receiver (detector). The system performance margin should be at least 6 dB. This includes the difference between the active component link loss budget, the passive cable attenuation (total fiber loss), and the total connector/splice loss.
AL. Tight Buffered, Non-Breakout Cable (Tight Buffer Cable) - Type of cable construction where glass fiber is tightly buffered (directly coated) with a protective thermoplastic coating to 900 µm (compared to 250 µm for loose tube fibers).

## FIBER OPTIC OUTSIDE PLANT CABLE

### General

Fiber optic outside plant cable (FOOP) shall be dielectric, gel filled or water-blocking material, duct type, with loose buffer tubes. Cables with singlemode fibers shall contain singlemode (SM) dual-window (1310 nm and 1550 nm) fibers. Optical fibers shall be contained within loose buffer tubes. Loose buffer tubes shall be stranded around a dielectric central member. Aramid yarn or fiberglass shall be used as a primary strength member, and a polyethylene outside jacket shall provide protection.

Fiber optic (F/O) cable shall be from the same manufacturer who is regularly engaged in the production of fiber optic cables.

Cables shall be compliant with RUS Federal Rule 7NTR1755.900.

| CABLE TYPE | DESCRIPTION |
|---|---|
| A | 24SMFO |
| B | 48SMFO |

### Fiber Characteristics

Optical fiber shall be glass and consist of a doped silica core surrounded by concentric silica cladding. Fibers in buffer tubes shall be usable fibers, and shall be sufficiently free of surface imperfections and occlusions to meet optical, mechanical, and environmental requirements of these specifications. Required fiber grade shall reflect the maximum individual fiber attenuation to guarantee required performance of fiber in cables.

Coating shall be dual layered, UV cured acrylate, mechanically or chemically strippable without damaging fibers.

Cable shall comply with optical and mechanical requirements over an operating temperature range of -40°C to +70°C. Cable shall be tested in accordance with EIA-455-3A (FOTP-3), "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components." Change in attenuation at extreme operational temperatures (-40°C to +70°C) for singlemode fiber shall not be greater than 0.20 dB/km, with 80 percent of measured values no greater than 0.10 dB/km. Singlemode fiber measurement shall be made at 1550 nm.

The attenuation specification for fibers shall be a maximum attenuation for each fiber over the entire operating temperature range of the cable.

Singlemode fibers within finished cables shall meet the following requirements:

| Fiber Characteristics Table | |
|---|---|
| Parameters | Singlemode |
| Type | Step Index |
| Core diameter | 8.3 µm (nominal) |
| Cladding diameter | 125 µm ±1.0 µm |
| Core to Cladding Offset | ≤0.8 µm |
| Coating Diameter | 250 µm ±15 µm |
| Cladding Non-circularity defined as: [1-(min. cladding dia ÷max. cladding dia.)] x 100 | ≤1.0% |
| Proof/Tensile Test | 345 MPa, min. |
| Attenuation: (-40°C to +70°C)<br>@850 nm<br>@1300 nm (MM)/1310 nm (SM)<br>@1550 nm | <br>N/A<br>≤0.4 dB/km<br>≤0.3 dB/km |
| Attenuation at the Water Peak | ≤2.1 dB/km @ 1383 ±3 nm |
| Bandwidth: | |
| @ 850 nm | N/A |
| @1,300 nm (MM)/1310 nm (SM) | N/A |
| Chromatic Dispersion:<br>Zero Dispersion Wavelength<br>Zero Dispersion Slope | <br>1301.5 to 1321.5 nm<br>≤0.092 ps/(nm2*km) |
| Maximum Dispersion: | ≤3.3 ps/(nm*km) for 1285 – 1330 nm<br><18 ps/(nm*km) for 1550 nm |
| Cut-Off Wavelength | <1260 nm |
| Numerical Aperture (measured in Accordance with EIA-455-47) | N/A |
| Mode Field Diameter (Petermann II) | 9.3 ±0.5 µm at 1310 nm<br>10.5 ±1.0 µm at 1550 nm |

**Color Coding**

In buffer tubes containing multiple fibers, each fiber shall be distinguishable from others in the same tube by means of color-coding according to the following:

| | |
|---|---|
| 1. Blue (BL) | 7. Red (RD) |
| 2. Orange (OR) | 8. Black (BK) |
| 3. Green (GR) | 9. Yellow (YL) |
| 4. Brown (BR) | 10. Violet (VL) |
| 5. Slate (SL) | 11. Rose (RS) |
| 6. White (WT) | 12. Aqua (AQ) |

Buffer tubes containing fibers shall be color-coded with distinct and recognizable colors according to the table listed above for fibers.

Colors shall be in accordance with the Munsell color shades and shall meet EIA/TIA-598 "Color Coding of Fiber Optic Cables."

Color formulations shall be compatible with fiber coatings and buffer tube filling compounds, and be heat stable. Colors shall not fade or smear or be susceptible to migration and shall not affect transmission characteristics of optical fibers and shall not cause fibers to stick together.

**Cable Construction**

Fiber optic cable shall consist of, but not limited to, the following components:

1. Buffer tubes
2. Central member

3. Filler rods
4. Stranding
5. Core and cable flooding
6. Tensile strength member
7. Ripcord
8. Outer jacket

1. Buffer Tubes

Clearance shall be provided in loose buffer tubes between fibers and insides of tubes to allow for expansion without constraining fibers. Fibers shall be loose or suspended within tubes and shall not adhere to insides of buffer tubes. Buffer tube shall contain a maximum of 12 fibers.

Loose buffer tubes shall be extruded from material having a coefficient of friction sufficiently low to allow free movement of fibers. The material shall be tough and abrasion resistant to provide mechanical and environmental protection of fibers, yet permit safe intentional "scoring" and breakout without damaging or degrading internal fibers.

Buffer tube filling compound shall be a homogeneous hydrocarbon-based gel with anti-oxidant additives and used to prevent water intrusion and migration. Filling compound shall be non-toxic and dermatologically safe to exposed skin. It shall be chemically and mechanically compatible with cable components, non-nutritive to fungus, non-hygroscopic and electrically non-conductive. Filling compound shall be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.

Buffer tubes shall be stranded around a central member by a method, such as the reverse oscillation stranding process, that will prevent stress on fibers when the cable jacket is placed under strain.

2. Central Member

The central member functions as an anti-buckling element and shall be a glass reinforced plastic rod with similar expansion and contraction characteristics as the optical fibers and buffer tubes. A symmetrical linear overcoat of polyethylene may be applied to central members to achieve optimum diameter to ensure proper spacing between buffer tubes during stranding.

3. Filler Rods

Fillers may be included in cables to maintain symmetry of cable cross-sections. Filler rods shall be solid medium or high-density polyethylene. The diameter of filler rods shall be the same as the outer diameter of buffer tubes.

4. Stranding

Completed buffer tubes shall be stranded around the overcoated central member using stranding methods, lay lengths and positioning so cables meet mechanical, environmental and performance specifications. A polyester binding shall be applied over stranded buffer tubes to hold them in place. Binders shall be applied with sufficient tension to secure buffer tubes to central members without crushing buffer tubes. Binders shall be non-hygroscopic, non-wicking (or rendered so by the flooding compound) and dielectric with low shrinkage.

5. Core and Cable Flooding

Cable core interstices shall contain a water blocking material to prevent water ingress and migration. Water blocking material shall be a polyolefin based compound which fills the cable core interstices or an absorbent polymer which fills voids and swells to block ingress of water. Flooding compound or material shall be homogeneous, non-hygroscopic, electrically non-conductive, non-nutritive to fungus, nontoxic, dermatologically safe, and compatible with other cable components.

6. Tensile Strength Member

Tensile strength shall be provided by high tensile strength Aramid yarns or fiberglass helically stranded evenly around cable cores and shall not adhere to other cable components.

7. Ripcord

Cables shall contain at least one ripcord under the jacket for easy sheath removal.

8. Outer Jacket

Jackets shall be free of holes, splits, and blisters and shall be medium or high-density polyethylene (PE), or medium density cross-linked polyethylene with minimum nominal jacket thickness of 1 mm ± 0.076 mm. Jacketing material shall be applied directly over tensile strength members and water blocking materials and shall not adhere to Aramid strength materials. Polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote fungus growth.

Jackets or sheaths shall be marked with the manufacturer's name, the words "Optical Cable", the number of fibers, "SM" as applicable, year of manufacture, and sequential measurement markings every meter. Actual cable lengths shall be within -0/+1 percent of length markings. Markings shall be a contrasting color to cable jackets. Heights of markings shall be 2.5 mm ±0.2 mm.

**General Cable Performance Specifications**

F/O cable shall withstand water penetration when tested with one meter static head or equivalent continuous pressure applied at one end of a one meter length of filled cable for one hour. No water shall leak through open cable ends. Testing shall be done in accordance with EIA-455-82 (FOTP-82), "Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable."

A representative sample of cable shall be tested in accordance with EIA/TIA-455-81 (FOTP-81), "Compound Flow (Drip) Test for Filled Fiber Optic Cable". No preconditioning period shall be conducted. Cables shall exhibit no flow (drip or leak) at 70°C as defined in the test method.

Crush resistance of finished F/O cables shall be 220 N/cm applied uniformly over the length of cables without showing evidence of cracking or splitting when tested in accordance with EIA-455-41 (FOTP-41), "Compressive Loading Resistance of Fiber Optic Cables". The average increase in attenuation for fibers shall be ≤0.10 dB at 1550 nm (singlemode) for a cable subjected to this load. Cables shall not exhibit measurable increase in attenuation after removal of load. Testing shall be in accordance with EIA-455-41 (FOTP-41), except that loads shall be applied at the rate of 3 mm to 20 mm per minute and maintained for 10 minutes.

Cables shall withstand 25 cycles of mechanical flexing at a rate of 30 ±1 cycles/minute. The average increase in attenuation for fibers shall be ≤0.20 dB at 1550 nm (singlemode) at the completion of testing. Outer cable jacket cracking or splitting observed under 10x magnification shall constitute failure. Testing shall be conducted in accordance with EIA-455-104 (FOTP-104), "Fiber Optic Cable Cyclic Flexing Test," with sheave diameters a maximum of 20 times the outside diameter of cables. Cables shall be tested in accordance with Test Conditions I and II of (FOTP-104).

Cables shall withstand 20 impact cycles, with a total impact energy of 5.9 N•m. Impact testing shall be conducted in accordance with TIA/EIA-455-25B (FOTP-25) "Impact Testing of Fiber Optic Cables and Cable Assemblies." The average increase in attenuation for fibers shall be <0.20 dB at 1550 nm for singlemode fiber. Cables shall not exhibit evidence of cracking or splitting.

Finished cable shall withstand a tensile load of 2700 N without exhibiting an average increase in attenuation of greater than 0.20 dB (singlemode). Testing shall be conducted in accordance with EIA-455-33 (FOTP-33), "Fiber Optic Cable Tensile Loading and Bending Test." The load shall be applied for one-half hour in Test Condition II of the EIA-455-33 (FOTP-33) procedure.

**Packaging and Shipping Requirements**

Documentation of compliance to specifications shall be provided to the Engineer prior to ordering materials.

Attention is directed to "Fiber Optic Testing," of these special provisions.

Completed cables shall be packaged for shipment on reels. Cables shall be wrapped in weather and temperature resistant covering. Both ends of cables shall be sealed to prevent ingress of moisture.

Ends of cables shall be securely fastened to reels to prevent cables from coming loose during transit. Four meters of cable on ends of cables shall be accessible for testing.

Cable reels shall have durable, weatherproof labels or tags showing the manufacturer's name, cable type, the actual length of cable on reels, the Contractor's name, the contract number, and the reel number. A shipping record shall be included in a weatherproof envelope showing the above information, including the date of manufacture, cable characteristics (size, attenuation, bandwidth, etc.), factory test results, cable identification number and other pertinent information.

Minimum hub diameter of reels shall be at least 30 times the diameter of the cable. F/O cable shall be in one continuous length per reel with no factory splices in fibers. Reels shall be marked to indicate the direction reels should be rolled to prevent loosening of cables.

Installation procedures and technical support information shall be furnished at the time of delivery.

## LABELING

### General

The Contractor shall label fiber optic cabling in a permanent consistent manner. Tags shall be of a material designed for long term permanent labeling of fiber optic cables. Metal tags shall be stainless steel with embossed lettering. Non-metal label materials shall be approved by the Engineer and marked with permanent ink. Labels shall be affixed to cables per the manufacturer's recommendations and shall not be affixed in a manner which will cause damage to fibers. Handwritten labels will not be allowed.

### Label Identification

1. Labeling of Cables

Labeling of backbones, distribution and drop fiber optic cables shall conform to the following unique identification code elements:

| UNIQUE IDENTIFICATION CODE ELEMENTS<br>For Backbone, Distribution or Drop Cables | | |
|---|---|---|
| DESCRIPTION | CODE | NUMBER OF CHARACTERS |
| District | District number | 2 |
| Cable Type | Fiber:<br>S: Singlemode<br>M: Multimode<br>T: 18 AWG, U: 19 AWG,<br>V: 20 AWG, W: 22 AWG<br>X: 24 AWG | 1 |
| Cable fiber (or copper pairs) Count | Number of fibers or conductor pairs<br>(Examples: 144 fibers; or 100 TWP) | 3 |
| Route Number | Hwy. Rte (Example: 005) | 3 |
| Begin Function | T: TMC; H: HUB; V: Video Node;<br>D: Data Node; C: Cable Node;<br>M: CCTV Camera; N: CMS;<br>P: Traffic Signal; Z: Ramp Meter;<br>U: Traffic Monitoring/Count Station/Vehicle Count Station (VDS, TOS);<br>S: Splice Vault | 1 |
| Begin Function Number | Unique ID number corresponds to Begin Function (Example: H02 [Hub 02]) | 2 |
| End Function | T: TMC; H: HUB; V: Video Node;<br>D: Data Node; C: Cable Node;<br>M: CCTV Camera; N: CMS;<br>P: Traffic Signal; Z: Ramp Meter;<br>U: Traffic Monitoring/Count Station;<br>S: Splice Vault | 1 |
| End Function Number | Unique ID number corresponds to Begin Function (Example: H03 [Hub 03]) | 2 |
| Unique Identifier | XX: If two or more cables of the same count are in the same run | 2 |
| TOTAL | | 17 |

Cables shall display one unique identification, regardless of where the cable is viewed. The begin function and end function correspond to end points of cables. The order of the begin and end functions follow the hierarchy listed below, where the lowest number corresponding to the begin/end function is listed first.

| List of Hierarchy | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| TMC | HUB | Video Node (VN) | Data Node (DN) | Cable Node | CCTV Camera | CMS | Traffic Signal | Ramp Meter | Traffic Monitoring/ Count Station | Splice Vault |

A cable between the TMC and a HUB will have the TMC listed as the start function and the HUB as the end function. Between a CMS and a Splice Vault, the start function will be listed as the CMS, and so on. If a cable is connected between HUBs, the lowest number, will be listed as the start function.

A cable labeled 07S060010H02H0302 would contain the following information:

| District | Mode | # of fibers | Route | Begin | End | Unique ID |
|---|---|---|---|---|---|---|
| 07 | S | 060 | 010 | H02 | H03 | 02 |

Example: 07S060010H02H0302

This cable is located in District 7, identified as a singlemode fiber optic cable containing 60 fibers, installed along highway Route 10, beginning in Hub 2, and ending in Hub 3, with unique ID of number 2. The implication for the unique ID is that there may be another 60 fiber optic cable between those hubs. This is an example for a backbone cable.

2. Labeling Jumpers and Pigtails

Labeling jumpers and pigtails shall conform to the following unique identification code elements:

| UNIQUE IDENTIFICATION CODE ELEMENTS for JUMPERS (active component to FDU) and PIGTAILS (to connector # on patch panel) | | |
|---|---|---|
| DESCRIPTION | CODE | NUMBER OF CHARACTERS |
| Hub Identifier | Hub, TMC , VN or DN ID Numbers or Alphanumeric or both | 2 |
| From (Source) Device | MU: Multiplexer<br>FD: FDU (Fiber Distribution Unit)<br>RP: Repeater | 2 |
| From (Source) Device Identifier | Numbers or Alphanumeric or both | 2 |
| Transmitter or Receiver | T or R | 1 |
| To (Destination) Device | MU: Multiplexer<br>FD: FDU (Fiber Distribution Unit)<br>RP: Repeater | 2 |
| To (Destination) Device Identifier | Numbers or Alphanumeric or both | 2 |
| Connector Identifier | Connector ID | 2 |
| TOTAL | | 13 |

A pigtail labeled 01MU01TFD0203 would contain the following information:

| Hub | Multiplexer | Transmitting to | To Patch Panel Position (Connector) |
|---|---|---|---|
| 01 | MU01 | TFD02 | 03 |

Example: 01MU01TFD0203.

This pigtail is located in Hub 1, from multiplexer 01, transmitting to FDU 02 to patch panel position (connector) 03.

**Label Placement**

1. Cables

Cables shall be labeled with the unique identification code element method at terminations, even if no connections or splices are made, and at splice vault entrances and exits.

2. Cable to Cable Splices

Cable jackets entering splice closures shall be labeled in accordance with the identification method.

3. Cable to Fiber Distribution Units

Cable jackets shall be labeled at entries to FDUs in accordance with the unique identification code element method. Fibers shall be labeled with Fiber IDs and pigtails shall be labeled at connectors with Fiber IDs. FDUs shall be labeled with Cable IDs on faces of FDUs. If multiple cables are connected to FDUs, each block of connectors relating to individual cables shall be identified by a single label with Cable IDs. Individual connections shall be marked on the face of FDUs in the designated area with Fiber IDs.

4. Fiber

Fiber labels shall be placed next to connectors of individual fibers.

5. Patch Panels

Cable jackets shall be labeled at entries to Patch Panels in accordance with the unique identification code element method. Fibers shall be labeled with Fiber IDs and pigtails shall be labeled at connectors with Fiber IDs. Patch panels shall be labeled with Cable IDs on faces of Panels. If multiple cables are connected to Patch Panels, each block of connectors relating to individual cables shall be identified by a single label with the Cable ID. Individual connections shall be marked on faces of Panels in the designated area with Fiber IDs.

6. Jumpers

Equipment to FDU jumpers shall be labeled as to equipment type connected and shall be labeled at both ends. FDU to FDU jumpers shall be labeled at each end in accordance with the unique identification code element method.

7. Pigtails

Pigtails shall be labeled at the connector in accordance with the unique identification code element method described elsewhere in these special provisions.

8. Copper Cable Labels

Twisted-pair communications cables shall be labeled in accordance with the unique identification code element method.

**CABLE INSTALLATION**

Cable installation shall be in conformance with the procedures specified by the cable manufacturer. The Contractor shall submit the manufacturer's recommended procedures for pulling fiber optic cable at least 20 working days prior to installing cable. Mechanical aids may be used provided that a tension measuring device, and break-away swivel are placed in tension to the end of cables. Tension in cables shall not exceed 2225 N or the manufacturer's recommended pulling tension, whichever is less.

During cable installation, the bend radius shall be a minimum of 20 times the outside diameter. Cable grips for installing fiber optic cables shall have a ball bearing swivel to prevent cables from twisting during installation.

F/O cable shall be installed using a cable pulling lubricant recommended by the F/O cable or innerduct manufacturer and a pull tape conforming to the provisions in "Conduit" of these special provisions. Personnel shall be stationed at splice vaults and pull boxes through which cables are pulled to lubricate and prevent kinking or other damage.

F/O cable shall be installed without splices except where allowed on the plans and shall be limited to one cable splice every 6 km if splice locations are not shown on the plans. Midspan access splices or FDU terminations shall involve fibers being spliced as shown on the plans. Cable splices shall be located in splice closures installed in splice vaults. A minimum of 20 m of slack shall be provided for F/O cables at splice vaults. Slack shall be divided equally on each side of F/O splice closures.

F/O cable shall be installed in each innerduct unless shown on the plans. Pulling separate F/O cables into spare ducts to replace damaged fiber will not be allowed.

Fiber may be installed using the air blown method. If integral innerduct is used, duct splice points or temporary splices of innerduct used for installation shall withstand static air pressure of 758 kPa.

Fiber installation equipment shall incorporate a mechanical drive unit or pusher, which feeds cable into pressurized innerduct to provide a sufficient push force on cables, which is coupled with drag force created by the high-speed airflow. Units shall be equipped with controls to regulate flow rates of compressed air entering ducts and hydraulic or pneumatic pressure applied to cables. Installation equipment shall accommodate longitudinally ribbed, or smooth wall ducts from nominal 16 mm to 51 mm inner diameter. Mid assist or cascading of equipment shall be used for installation of long cable runs. Installation equipment shall be equipped with safety shutoff valves to disable the system in the event of sudden changes in pneumatic or hydraulic pressure.

Installation equipment shall not require the use of pistons or other air capturing devices to impose a pulling force at the front end of cables which significantly restricts free flow of air through inner ducts. Installation equipment shall use a counting device to determine the speed of cables during installation and lengths of cable installed.

**SPLICING**

Field splices shall be done in splice vaults or cabinets, in splice trays housed in splice closures. Splices in cabinets shall be done in splice trays housed in FDU's.

Fiber splices shall be fusion type unless otherwise specified. Mean splice loss shall not exceed 0.07 dB per splice and shall be obtained by measuring loss through splices in both directions and averaging the resultant values.

Splices shall be protected with a metal reinforced thermal shrink sleeve.

The mid-span access method shall be used to access individual fibers in cables for splicing to other cables. Cable manufacturers recommended procedures and approved tools shall be used for mid-span access. Only fibers to be spliced shall be cut. Buffer tubes and individual fibers not being used in mid-span access shall not be modified or damaged.

Individual fibers shall be looped one full turn within splice trays to avoid micro bending. A 45 mm minimum bend radius shall be maintained during installation and after final assembly in optical fiber splice trays. Bare fibers shall be individually restrained in splice trays. Optical fibers in buffer tubes and placement of bare optical fibers in splice trays shall not produce tensile force on optical fibers.

The Contractor will be allowed to splice 12 percent of fibers to repair damage done during mid-span access splicing without penalty. The Engineer will assess a fine of $300.00 for each additional and unplanned splice. A single fiber may not have more than 3 unplanned splices. If a fiber requires more than 3 unplanned splices, the entire length of F/O cable shall be replaced at the Contractor's expense.

**SPLICE CLOSURES**

F/O field splices shall be enclosed in splice closures, complete with splice organizer trays, brackets, clips, cable ties, seals and sealant, as needed. Splice closures shall be suitable for direct burial or pull box applications. Manufacturer’s installation instructions shall be supplied to the Engineer prior to installation of splice closures. Location of splice closures shall be where a splice is required as shown on the plans, where designated by the Engineer, or described in these special provisions.

Splice closures shall conform to the following specifications:

A. Non-filled thermoplastic case
B. Rodent proof, water proof, re-enterable and moisture proof
C. Expandable from 2 cables per end to 8 cables per end by using adapter plates
D. Cable entry ports shall accommodate 10-mm to 25-mm diameter cables
E. Multiple grounding straps
F. Accommodate up to 8 splice trays
G. Suitable for "butt" or "through" cable entry configurations
H. Place no stress on finished splices within splice trays

Splice closures shall be bolted to side walls of splice vaults.

The Contractor shall verify the quality of splices prior to sealing splice closures. Splice closures shall not be sealed until link testing is performed and is approved by the Engineer.

**SPLICE TRAYS**

Splice trays shall accommodate a minimum of 12 fusion splices and shall allow a minimum bend radius of 45 mm. Individual fibers shall be looped one full turn within splice trays to allow for future splicing. Stress shall not be applied on fibers when located in final position. Buffer tubes shall be secured near entrances of splice trays. Splice tray covers may be transparent.

Splice trays shall conform to the following:

A. Accommodate up to 24 fusion splices
B. Place no stress on completed splices within the tray
C. Stackable with a snap-on hinge cover
D. Buffer tubes securable with channel straps
E. Accommodate a fusion splice with the addition of an alternative splice holder
F. Be labeled after splicing is completed.

Only one splice tray may be secured by a bolt through the center of the tray in fiber termination units. Multiple trays shall be securely held in place per the manufacturer's recommendation.

**PASSIVE CABLE ASSEMBLIES AND COMPONENTS**

F/O cable assemblies and components shall be compatible components, manufactured by a company regularly engaged in the production of material for the fiber optic industry. Components or assemblies shall be best quality, non-corroding, with a minimum design life of 20 years.

The cable assemblies and components manufacturer shall be ISO 9001 registered.

**FIBER OPTIC CABLE TERMINATIONS**

**General**

Fiber optic outside plant (FOOP) cable entering buildings shall be routed as described in these special provisions and as shown on the plans. Cables shall continue within conduit to the designated cable termination point. Components shall be the size and type required for the specified fiber.

**Cable Termination**

At the FDU, the cable jacket of the FOIP, or outside plant cable, shall be removed exposing the Aramid yarn, filler rods, and buffer tubes. The exposed length of buffer tubes shall be at least the length recommended by the FDU manufacturer which allows the tubes to be secured to the splice trays. Buffer tubes shall be secured to splice trays in which they are to be spliced. The remainder of the tubes shall be removed to expose sufficient length of fibers to properly install on splice trays, conforming to the requirements in "Splicing," of these special provisions.

When applicable, moisture-blocking gel shall be removed from exposed buffer tubes and fibers. The transition from the buffer tube to the bundle of jacketed fibers shall be treated by an accepted procedure for sleeve tubing, shrink tube and silicone blocking of the transition to prevent future gel leak. Manufacturer directions shall be followed to ensure gel will not flow from ends of buffer tubes throughout the specified temperature range. Individual fibers shall be stripped and prepared for splicing.

Factory terminated pigtails shall be spliced and placed in splice trays.

Fibers inside fiber optic cables entering Fiber Distribution Units (FDU) shall be terminated and labeled. Attention is directed to "Fiber Distribution Unit" of these special provisions.

A transition shall be made with flexible tubing to isolate fibers and protect individual coated fibers. The final transition from bundle to individual fiber tube shall be secured with an adhesive heat shrink sleeve. Attention is directed to Fan-Out Termination, of these special provisions.

**Distribution Interconnect Package**

Distribution involves connecting fibers to locations shown on the plans. The distribution interconnect package consists of FDFs and FDUs with connector panels, couplers, splice trays, fiber optic pigtails and cable assemblies with connectors. The distribution interconnect package shall be assembled and tested by a company regularly engaged in the assembly of these packages. Attention is directed to "Fiber Optic Testing" of these special provisions. Distribution components shall be products of same manufacturers, regularly engaged in the production of these components with quality assurance programs.

**Fiber Optic Cable Assemblies and Pigtails**

1. General

Cables for cable assemblies shall be made of fiber meeting the performance requirements of these special provisions for the F/O cable being connected.

2. Pigtails

Pigtails shall be of simplex (one fiber) construction, in 900-μm tight buffer form, surrounded by Aramid yarn for strength, with a PVC jacket with manufacturer's identification information, and a nominal outer jacket diameter of 3 mm. Singlemode simplex cable jackets shall be yellow in color. Pigtails shall be factory terminated and tested and at least one meter in length.

3. Jumpers

Jumpers may be of simplex or duplex design. Duplex jumpers shall be duplex round cable construction and shall not have zipcord (Siamese) construction. Jumpers shall be at least 2 m in length.

Outer jackets of duplex jumpers shall be yellow. The 2 inner simplex jackets shall be contrasting colors to provide easy visual identification for polarity.

4. Connectors

Connectors shall be ceramic ferrule ST type for SMFO. Indoor ST connector body housings shall be nickel-plated zinc or glass reinforced polymer construction. Outdoor ST connector body housings shall be glass reinforced polymer.

Associated couplers shall be the same material as connector housings.

F/O connectors shall be the 2.5 mm connector ferrule type with Zirconia Ceramic material with a PC (Physical Contact) pre-radiused tip.

The ST connector operating temperature range shall be -40°C to +70°C. Insertion loss shall not exceed 0.4 dB for singlemode and return reflection loss on singlemode connectors shall be at least -35 dB. Connection durability shall be less than a 0.2 dB change per 500 mating cycles per EIA-455-21A (FOTP-21). Terminations shall provide a minimum 222 N pull out strength. Factory test results shall be documented and submitted to the Engineer prior to installing connectors. Singlemode connectors shall have a yellow color on the body and boot that renders them easily identifiable.

Field terminations shall be limited to splicing of adjoining cable ends and cables to ST pigtails.

Connectors shall be factory-installed and tested.

Unmated connectors shall have protective caps installed.

**Fiber Distribution Unit**

The Contractor shall furnish and install components to terminate incoming fiber optic communication cables.

| FDU Type | Accommodates Termination of |
|---|---|
| A | 24SMFO fibers |
| B | 48 SMFO fibers |

Fiber distribution units (FDU) shall include the following:

1. A patch panel to terminate the appropriate number of singlemode fibers with ST type connectors feed through couplers.
2. Splice trays.
3. Storage for splice trays.
4. A slide out metal drawer for storage of spare jumpers.

Strain relief shall be provided for incoming fiber optic cables. Cable accesses shall have rubber grommets or similar material to prevent cables from contacting bare metal. Fibers shall be terminated and individually identified in FDUs and on patch panels.

Patch panels shall be hinged or have coupler plates to provide easy access and maintenance. Brackets shall be provided to spool incoming fibers a minimum of 2 turns. Turns shall not be less than 300 mm before separating out individual fibers to splice trays.

FDUs shall be 482 mm rack mountable.

FDUs shall not exceed 250 mm in height and 380 mm in depth.

Termination and distribution cable trays shall accommodate 24 and 48 singlemode fiber optic cables and shall have sufficient tray areas for excess optical fiber storage with provisions to assure that optical fibers do not exceed a 51-mm bend radius. Termination and distribution cable trays shall include a designation strip for identification of 24 and 48 singlemode optical fibers. Splice drawers shall include 2 splice trays with each splice tray capable of accommodating 24 and 48 fusion type splices. Splice drawers shall allow storage of excess lengths of optical fibers of fiber optic cables. Fiber distribution units shall be provided with cable clamps to secure fiber optic cables to the chassis.

**Installation**

The Contractor shall install sufficient quantity of fiber distribution units to terminate fibers in the largest cable. Fiber distribution shall be mounted in equipment racks as shown on the plans. At fiber distribution units, the Contractor shall terminate optical fibers of fiber optic cable. Optical fibers shall be fusion spliced to singlemode optical fiber cables assemblies within splice trays.

Optical fibers shall be of appropriate lengths to allow future splicing with splice drawers and shall be appropriately identified. Splices shall be fusion type and shall be arranged within splice trays of fiber distribution units in accordance with the organizational design of splice trays. Appropriate protective coatings shall be applied to fusion splices.

**Payment**

Full compensation for fiber distribution unit (FDU) shall be considered as included in the contract prices paid for the item requiring fiber distribution unit and no separate payment will be made therefor.

### Fan-Out Termination

Fan out terminations shall be required as shown on the plans, as designated by the Engineer or described in these special provisions.

Fan out terminations may be used to terminate incoming fiber optic cable for fiber counts of less than 6 fibers. Connector return loss shall be no greater than -40 dB.

Fan out terminations shall consist of splice connector and the appropriate number of fiber optic pigtails, which will be fusion spliced to incoming fibers.

Pigtails shall be contained in housings that provide strain relief between incoming fiber optic cable plant jackets, buffer tubes, fibers and pigtail jacket material.

Fibers shall be spliced to pigtails with a factory installed and polished ST connector, as specified in these special provisions. Splices shall be encapsulated in weatherproof housings. Connectors shall have weatherproof caps. Pigtails shall be simplex (one fiber) construction, in a 900-µm tight buffer form, surrounded by Aramid yarn. Buffers shall have PVC jackets with manufacturer identification information, and a nominal outer jacket diameter of 3 mm. Singlemode simplex cable jackets shall be yellow in color. Pigtails shall be at least 2 meters in length.

Pigtails shall be labeled, as specified in these special provisions, and secured onto cables using clear heat shrink tubing.

## FIBER OPTIC TESTING

### General

Testing shall include tests on elements of passive fiber optic components: (1) at the factory, (2) after delivery to the project site but prior to installation, (3) after installation but prior to connection to other portions of the systems. The Contractor shall provide personnel, equipment, instrumentation, and materials necessary to perform testing. The Engineer shall be notified 2 working days prior to field tests. Notification shall include the exact location or portion of system to be tested.

Documentation of test results shall be provided to the Engineer within 2 working days after testing.

A minimum of 15 working days prior to arrival of cable at the site, the Contractor shall provide detailed test procedures for field testing for the Engineer's review and approval. Procedures shall include tests involved and how tests are to be conducted. Test procedures shall include the model, manufacturer, configuration, calibration, and alignment procedures for proposed test equipment.

### Factory Testing

Documentation of compliance with fiber specifications as listed in the Fiber Characteristics Table shall be supplied by the original equipment manufacturer. Before shipment, but while on shipping reels, 100 percent of fibers shall be tested for attenuation. Copies of the results shall be (1) maintained on file by the manufacturer with a file identification number for a minimum of 7 years, (2) attached to cable reels in waterproof pouches, and (3) submitted to the Contractor and to the Engineer.

### Arrival On Site

Cables and reels shall be physically inspected on delivery and 100 percent of fibers shall be attenuation tested to confirm that cable meets requirements. Failure of a fiber in the cable shall be cause for rejection of the entire reel. Test results shall be recorded, dated, compared and filed with copies accompanying shipping reels in a weatherproof envelopes. Attenuation deviations from shipping records of greater than 5 percent shall be brought to the attention of the Engineer. Cables shall not be installed until completion of testing and written approval of the Engineer. Copies of traces and test results shall be submitted to the Engineer. If test results are unsatisfactory, the reel of F/O cable shall be considered unacceptable and records corresponding to that reel of cable shall be marked accordingly. Unsatisfactory reels of cable shall be replaced with new reels of cable at the Contractor's expense. New reels of cable shall be tested to demonstrate acceptability. Copies of test results shall be submitted to the Engineer.

### After Cable Installation

Index matching gel will not be allowed in connectors during testing. After fiber optic cable has been pulled, but before breakout and termination, 100 percent of fibers shall be tested with an OTDR for attenuation. Test results shall be recorded, dated, compared, and filed with previous copies of these tests. Copies of traces and test results shall be submitted to the Engineer. If OTDR test results are unsatisfactory, the F/O cable segment of cable will be rejected. Unsatisfactory segments of cable shall be replaced with new segments, without additional splices, at the Contractor's expense. New cable segments shall be tested to demonstrate acceptability. Copies of test results shall be submitted to the Engineer.

**System Cable Verification At Completion**

1. Power Meter and Light Source

At the conclusion of OTDR testing, 100 percent of fiber links shall be tested end-to-end with a power meter and light source, in accordance with EIA Optical Test Procedure 171 and in the same wavelengths specified for OTDR tests. Tests shall be conducted in one direction. As shown in Appendix A, the Insertion Loss (1C) shall be calculated. Test results shall be recorded, compared, and filed with the other recordings of the same links. Test results shall be submitted to the Engineer. These values shall be recorded in the Cable Verification Worksheet in Appendix A.

2. OTDR Testing

Once passive cabling systems have been installed and are ready for activation, 100 percent of fibers shall be tested with OTDR for attenuation at wavelengths of 1310 nm and 1550 nm. OTDR testing shall be performed in both directions (bi-directional) on fibers. Test results shall be generated from software of test equipment, recorded, dated, compared and filed with previous copies. A hard copy printout and an electronic copy on a DOS based 89 mm diskette of traces and test results shall be submitted to the Engineer. The average of the 2 losses shall be calculated and recorded in the Cable Verification Worksheet in Appendix A. The OTDR shall be capable of recording and displaying anomalies of at least 0.02 dB. Connector losses shall be displayed on OTDR traces.

3. Cable Verification Worksheet

The Cable Verification Worksheet shown in Appendix A shall be completed for links in fiber optic systems using data gathered during cable verification. The completed worksheets shall be included as part of system documentation.

4. Test Failures

If link loss, measured from the power meter and light source, exceeds the calculated link loss, or the actual location of fiber ends does not agree with the expected location of fiber ends, fiber optic links will not be accepted. Unsatisfactory segments of cable or splices shall be replaced with new segments of cables or splices at the Contractor's expense. OTDR testing, power meter and light source testing and Cable Verification Worksheet shall be completed for repaired links to determine acceptability. Copies of test results shall be submitted to the Engineer. Removal and replacement of segments of cable shall be considered as removal and replacement of a single contiguous length of cable connecting 2 splices and 2 connectors. Removal of a section containing the failure will not be allowed.

**Passive Component Package Testing and Documentation**

Components in the passive component package (FDUs, pigtails, jumpers, couplers, and splice trays) shall be from a manufacturer who is ISO 9001 registered.

Pigtails or jumpers shall be tested for insertion attenuation loss using an optical power meter and light source. Singlemode terminations shall be tested for return reflection loss. Values shall meet loss requirements specified and shall be recorded on tags attached to the pigtail or jumper.

Once an assembly is complete, the manufacturer shall visually verify that tagging of loss values is complete. The manufacturer shall do an "end-to-end" optical power meter/light source test from pigtail ends to end of terminating points assuring continuity and overall attenuation loss values are acceptable.

Final test results shall be recorded, along with previous individual component values, on a special form assigned to each FDU. The completed form shall be dated and signed by the Manufacturer's Quality Control supervisor. One copy of the form shall be attached in a plastic envelope to the assembled FDU unit. Copies shall be provided separately to the Contractor and the Engineer, and shall be maintained on file by the manufacturer or supplier.

Assembled and completed FDU units shall be protectively packaged for shipment to the Contractor for installation.

**Fiber Optic System Performance Margin Design Criteria**

Installed system performance margin shall be at least 6 dB for links. If the design system performance margin is less than 6 dB, the Engineer shall be notified of the Contractor's plan to meet that requirement.

**Active Component Testing**

Transmitters and receivers shall be tested with a power meter and light source to record transmitter average output power (dBm) and receiver sensitivity (dBm). Values shall be recorded in the Fiber System Performance Margin Calculations Worksheet in Appendix B, section C, number 6.

**APPENDIX A**

**Cable Verification Worksheet**
*End-to-End Attenuation (Power Meter and Light Source) Testing and OTDR Testing*

Contract No. _____ Contractor: _____

Operator: _____ Date: _____

Link Number: _____ Fiber Number: _____

Test Wavelength (Circle one): 1310 nm 1550 nm

Expected Location of fiber ends: End 1: _____ End 2: _____

Power Meter and Light Source Test Results:

| | | |
|---|---|---|
| Power In: | _____ dBm | 1A |
| Output Power: | _____ dBm | 1B |
| Insertion Loss [1A - 1B]: | _____ dB | 1C |

OTDR Test Results:

| | | |
|---|---|---|
| Forward Loss: | _____ dB | 2A |
| Reverse Loss: | _____ dB | 2B |
| Average Loss [(2A + 2B)/2]: | _____ dB | 2C |

---

To Be Completed by Caltrans:
Resident Engineer's Signature: _____
Cable Link Accepted: _____

**APPENDIX B**
**Fiber System Performance Margin Calculations Worksheet**

**A. Calculate the Passive Cable Attenuation**

| | | |
|---|---|---|
| 1. Calculate Fiber Loss at Operating Wavelength: _____ nm | Cable Distance (times)<br>Individual Fiber Loss (equal)<br>@ 1310 nm (0.4 dB/km)<br>@ 1550 nm (0.3 dB/km) | _____ km x ___ dB/km = |
| | **Total Fiber Loss:** | _____ dB |

**B. Calculate the Total Connector/Splice Loss**

| | | |
|---|---|---|
| 2. Calculate Connectors/couplers Loss:<br>(exclude Tx and Rx connectors) | Individual Connector Loss (times)<br>Number of Connector Pairs (equal)<br>**Total Connector Loss:** | 0.4 dB x ____ =<br>_____ dB |
| 3. Calculate Splice Loss: | Individual Splice Loss (times)<br>Number of Splices (equal)<br>**Total Splice Loss:** | 0.1 dB x ____ =<br>_____ dB |
| 4. Calculate Other Components Loss: | **Total Components:** | _____ dB |
| 5. Calculate Total Losses: | Total Connector Loss (plus)<br>Total Splice Loss (plus)<br>Total Components (equal) | + dB<br>+ dB<br>+ dB = |
| | **Total Connector/Splice Loss:** | _____ dB |

**C. Calculate Active Component Link Loss Budget**

| | | |
|---|---|---|
| System Wavelength:<br>Fiber Type:<br>Average Transmitter Output (Launch Power): | | _____ nm<br>singlemode<br>_____ dBm |
| Receiver MAX Sensitivity ($10^9$ BER) (minus)<br>Receiver MIN Sensitivity (equal) | **Receiver Dynamic Range:** | _____ dBm<br>- _____ dBm =<br>_____ dB |
| 6. Calculate Active Component Link Loss Budget: | Average Transmitter Output (Launch Power) (minus)<br>Receiver MAX Sensitivity (equal) | _____ dBm<br>- _____ dBm = |
| | **Active Component Link Loss Budget:** | _____ dB |

**D. Verify Performance**

| | | |
|---|---|---|
| 7. Calculate System Performance Margin to Verify Adequate Power: | Active Component Link Loss Budget **[C]** (minus)<br>Passive Cable Attenuation **[A]** (minus)<br>Total Connector/Splice Lost **[B]** (equal) | _____ dB<br>- _____ dB<br>- _____ dB = |
| | **System Performance Margin:** | _____ dB |

## 10-3.10 CABLE NODE DOCUMENTATION

Cable node documentation shall consist of the following:

A copy of the final fiber assignment tables
A copy of the final system schematic diagrams
A copy of the element reference table

Additional information may be supplied by the Engineer to be used to produce the documentation listed above by adding the related information that applies to this project.

Full compensation for cable node documentation shall be considered as included in the contract lump sum price paid for communication system routing (modify), and no separate payment will be made therefor.

## 10-3.11 SYSTEM TESTING AND DOCUMENTATION

The following existing system testing specification is the same as from those used on the contract for the existing communication system routing installation. The Contractor shall provide system testing, as required, to meet these specifications, as part of the communication system routing, as shown on the plans. The existing communication system routing is described in these special provisions to assist the Contractor in understanding the scope of work involved. Except for verification and testing of the condition of the existing system before and after the new system, the scope of the Contractors work shall be as defined on plans.

As built plans for the existing communication system routing are available for inspection at the Department of Transportation, Construction Office, 100 South Main Street, Los Angeles California 90012.

The system testing shall cover pre-installation testing, fiber optic cable testing, video link testing, physical inspection, functional testing, performance testing, final acceptance testing and recording test results, and system documentation that are required to validate the operational performance of the installed fiber optic cables as described elsewhere in these special provisions.

**Test Plan**

The Contractor shall develop and submit within 20 working days, after the approval of the Contract, to the Engineer an installation and test plan for approval, which details the method of installation and all testing for all new material, cables and the associated schedule of activities, based on these special provisions, plans, the manufacturer's recommended test procedures, and industry standard practices. Three copies of the test plan shall be submitted to the Engineer for approval. The Engineer will review then approves, or disapproves, the plan within two weeks. If the Engineer rejects the test plan the Contractor shall submit a revised test plan within 20 working days for review and approval by the Engineer. No testing shall be performed until the Engineer has approved the Contractor's test plan. The tests shall demonstrate that the design and production of new material and cables meet the requirements of these special provisions and plans.

All test results, including results of failed test or re-tests, shall be submitted, and delivered to the Engineer and a copy placed with the equipment at the site.

The Contractor shall supply all test equipment.

The Contractor shall notify the Engineer of his intent to proceed with functional and sub-system testing 48 hours prior to commencement of each test. Sub-system testing and inspections shall include visual inspection for damage, incorrect installation, adjustments and alignment, and measurement of parameters and operating conditions.

**Pre-Installation Testing**

Pre-installation testing shall include testing of all new material, and cables in a laboratory environment prior to delivery to the site. The Contractor shall arrange use of laboratory facilities, including an environmental simulation chamber. The tests shall either be conducted at the manufacturer's premises or at a laboratory arranged by the Contractor.

All material, except test equipment and special tools, shall be bench tested in accordance with the following paragraphs, which include those items, described elsewhere requiring pre-installation testing for each individual item where applicable.

All active equipment shall be connected to normal operating power, energized and subjected to normal operating conditions for a continuous period of time in the laboratory of not less than 48 hours.

Functional testing shall be performed by the manufacturer on all material prior to delivery to the site. The functional tests shall be performed in accordance with an approved test plan. Any material, which fails to meet the requirements of the contract, shall be repaired or replaced and the test shall be repeated until satisfactory. All functional test results, including results of failed tests or re-tests, shall be submitted and delivered with all material delivered to the site.

The manufacturer in accordance with a test plan developed by the Contractor and approved by the Engineer shall perform full performance test.

**Sub-system Testing**

Sub-system testing shall encompass the testing of all new and existing material, and cables after installation of new material at the site, and cables, but prior to acceptance tests. These tests shall be done in accordance with the performance testing called for under each individual item in these special provisions.

New material and cables shall be installed in accordance with the plans and special provisions. Sub-system testing and inspections shall include visual inspection for damaged or incorrect installation, adjustments and alignment, and measurement of parameters and operating conditions. The Contractor shall notify the Engineer of his intent to proceed with sub-system testing 48 hours prior to commencement of each test.

Installation documentation and test results shall be provided for all new material, and cables prior to commencement of acceptance tests.

Installation documentation shall be in accordance with these special provisions and shall include the following as appropriate:

Model, part number and serial number for all material.
Test equipment models number, serial number, settings, and date of last calibration.
All strap and switch settings.
Record of all adjustments and levels.
Alignment measurements.
Identification of interconnections.
All factory, laboratory, and site test results.

**Fiber Optic Cable Testing**

Attention is directed to "Fiber Optic Testing" elsewhere in these special provisions.

**Video Link Testing**

The video link testing shall be conducted after the Contractor submits a test plan and receives approval from the Engineer, based on these special provisions, plans and the manufacture's recommended test procedures for the equipment and cable involved.

Video link testing shall be conducted from the existing Cable Node GS185 (Interchange of Route 10 and Route 5) to the existing Cable Node GS363 (Interchange of Route 170 and Rte 5) that are connected to the existing trunk line fiber optic cables, as shown on the plans and as directed by the Engineer.

The video link is to provide point-to-point transmission and reception of a full motion NTSC baseband video signal using an optical fiber as the transmission medium. Video system performance tests for any particular video link shall be performed after the interconnecting fiber optic cables have been installed and tested.

The video link in the communications system shall be tested with a video test signal at the video transmitter input. The Contractor shall perform all level adjustments and alignments required on the video link in order for it to operate in accordance with these special provisions. If any video link fails to meet the performance requirements, the Contractor shall take all steps necessary to restore the failed link to the required performance.

Each video link in the communication system routing shall be tested for qualitative performance with its associated camera turned on and connected to the BNC connector of the video transmitter. To do this, the measured optical attenuation of the fiber being used shall be increased to the point at which the video test set just begins to show a 3 dB degradation of the video signal to noise ratio in accordance with EIA 250 video test procedures. The optical receive power into the video (de)multiplexers shall be measured and recorded. Then the optical attenuation shall be decreased until the video test set once again shows degradation of the video and registers errors. At no time shall the optical power into the video (de)multiplexers exceed the manufacturer's specified saturation level. The optical receive level shall once again be measured and recorded. These minimum and maximum receive levels define the video (de)multiplexers dynamic range and shall meet or exceed the specifications as specified elsewhere under these special provisions. The Contractor shall measure and record the base-band video output level from the video (de)multiplexers under test. This measurement shall be repeated for each video link affected by the Contractor's work.

The output video signal shall be connected to a video display monitor. The observed picture on the video display monitor shall be assessed for qualitative performance. All qualitative comments shall be recorded for each camera.

The Engineer shall approve the video test set. All video links affected by the Contractor's work shall be tested for the following performance characteristics. The Contractor shall measure, record and demonstrate that the performance meets or exceed the specified EIA RS-250 requirements listed below:

Differential gain.
Differential phase.
Chrominance to luminance delay inequality.

Amplitude vs. frequency characteristics.
Frequency response characteristic.
Signal to noise ratio.
Signal to low frequency noise.
Signal to periodic noise.
Output signal level.

**FINAL ACCEPTANCE TESTING**

The final acceptance testing shall be conducted in accordance with the approved final acceptance test plan and shall include conducting acceptance tests, as described below and subsequent retest, and documentation of the test results.

The final acceptance testing shall take place only in the presence of the Engineer and the TMC Support Engineer, telephone (213) 897-0329, or the Caltrans Maintenance Supervisor, or the designated person, as directed by the Engineer.

Final acceptance tests shall be conducted after the site and sub-system test results have been reviewed and accepted by the Engineer. These final acceptance tests shall include the complete system in normal operations. The final acceptance test plan shall address the full testing requirements of the specifications. The final acceptance test plan shall detail all tests to be performed, the expected test results, and the test schedule.

The final acceptance test plan shall include the following major tests and acceptance categories:

Physical inspection.
Functional tests.
Performance tests.

The Contractor shall test the communications system according to the approved acceptance test plan and shall provide all test equipment, labor, and ancillary items required to perform the testing. The test equipment shall be certified to be calibrated to the manufacturer's specifications. The model and part numbers and date of last calibration of all test equipment shall be included with the test results.

Acceptance testing shall not commence until all material required by these special provisions and plans are delivered, installed, and aligned and the Engineer has approved all production test and site test documentation and results.

All acceptance test results shall be fully documented and such documentation provided as a condition of acceptance.

**Physical Inspection**

The Contractor shall provide documentation to prove delivery of all material, equipment, cable, and documentation. If any material or documentation is outstanding or have been replaced under pre-acceptance warranty a physical inspection and documentation shall be provided for this material. The physical inspection shall consist of inspecting all installed material to ensure workmanship satisfies the specified requirements.

**Functional Tests**

The Contractor shall test all system functions to demonstrate that all circuits (video, data, and voice), cameras, camera control and all equipment satisfies the functional requirements of the specifications.

This testing shall include subjective testing of each camera image and verification of camera control from the camera control receiver. The connectivity of each data channel shall be demonstrated. The Contractor shall document all functional test results. In the event that any aspect of the functional tests are determined by the Engineer to have failed, the Contractor all cease all acceptance testing and determine the cause of the failure and make repairs to the satisfaction of the Engineer. Acceptance testing shall, at the discretion of the Engineer, be repeated beginning from the start of functional tests.

**Performance Tests**

The Contractor shall conduct operational performance tests on the following:

1. The video links from the existing Cable Node GS185 (Route 5/Route 10) to existing Cable node GS363 (Route 5/Route 170) that are connected to the existing trunk line fiber optic cables.

Video link tests shall satisfy the end-to-end performance requirements under normal operating conditions. Video tests shall be measured with the camera video output transmitting a video signal at the input of the video display monitors. The Contractor shall test the video sub-system and record the results.

The video signal to noise shall be measured according to EIA-250. The video signal to noise ratio shall be measured and recorded with both the camera providing the video-input reference and with suitable video test equipment providing the video reference signal. When the source is the test equipment, the video signals to noise ratio shall be greater than 47 dB.

Adjustments shall be calculated to account for any deviation in output level of the camera resulting from the variable light conditions, the automatic iris, and associated automatic gain control. The resulting video signal to noise ratio shall be recorded.

The video signal to low frequency noise ratio shall be measured according to EIA-250. The resulting video signal to low frequency noise ratio shall be greater than 39 dB. If an AGC circuit does not allow measurement as per EIA-250, the Contractor shall submit an alternative test plan for approval.

The video signal to periodic noise ratio shall be measured according to EIA-250. The resulting video signal to periodic noise ratio shall be greater than 52 dB.

Data tests shall be performed on all operational and voice data circuits affected by the Contractor's work using appropriate test equipment for the measurement of the following parameters:

A. End-to-end bit error rate tests shall be run from the data nodes 6 and 7 to each remote drop of each data circuit. A data test set shall be used at both the data nodes 6 and 7 and the remote modems to insert an asynchronous pseudo-random pattern using 8 data bits, 1 start bit, 1 stop bit and even parity. The data test set at the remote modem must hold RTS high for the duration of the data test. The data rate of the test sets shall be set to rate as employed in the system.
B. 15-minute test on each drop of each multi-point circuit shall be error free in both directions. One drop of each circuit as chosen by the Engineer shall be tested for 72 hours. The average bit error rate in both directions shall be less than $1 \times 10^{-6}$ at 9600 bps.

**SYSTEM DOCUMENTATION**

The Contractor shall submit a draft copy of all documentation for review and approval prior to production of documentation. The Engineer will review and approve or reject the draft documentation within four weeks of receipt.

The Contractor shall modify the documentation if required and submit provisional documentation. The Engineer will approve or reject the provisional documentation within three weeks of receipt. The Contractor shall arrange for re-submission in a timely manner to meet the schedule in the case that the documents were rejected.

Draft documentation shall be submitted eight weeks prior to the start of installation. The draft documentation shall show the general approach in preparing the final manuals.

Upon approval of he draft documentation provisional documentation shall be supplied three weeks prior to the start of site testing. The provisional documentation shall be of the same format as the final manuals but with temporary insertion for items, which cannot be finalized until the system is completed tested and accepted. Final documentation shall be submitted no later than four weeks after completion of the acceptance tests and shall incorporate all comments made during the approval stages. The Contractor shall be responsible for all delay caused by non-compliance to the specified requirements.

Final documentation shall be approved prior to its production. Ten copies of all final documents shall be delivered. The copies shall be 215 mm x 279 mm paper and bound in three-ring hard-covered binders complete with dividers. System documentation shall be arranged in an operation and maintenance (O & M) manual format providing all the information necessary to operate, maintain, and repair the equipment and cable to the lowest module or component level. The operation and maintenance manual shall as a minimum consist of the following sub-section as described below:

**Master Items Index**

This shall be the first section of the O & M manual. The section shall describe the purpose of each manual and brief description to the directory of the manual. It shall also reference equipment manuals as required for additional and support material.

**System Description and Technical Data**

This section shall contain an overall description of the system and associated equipment and cables with illustrative block diagrams. This section shall identify all equipment and cables in the system stating the exact module and option number that are employed in the system. Technical data specification and settings for every type of equipment or cable shall be provided. Any modification that has been done on the equipment shall be clearly described.

**Theory of Operation**

The manual shall contain a functional description of each element of the system, explaining how each function is being achieved separately and how each element works together to form the complete system.

**Software Documentation**

Proper documentation for all software shall be provided. The software documentation shall include a clear description of the system's functionality and specifications. Description on each software modules and programs shall be provided. The Contractor shall supply related programming and system user manuals, application and utilities software use manual, and all associated proprietary software manuals. Software listing of all custom programs shall also be provided, as well as a copy of any software source code.

**Operations**

The manual shall describe how to operate the system and each particular type of equipment and software. Equipment layout, layout of controls, displays, software operating procedures and all other information required to correctly operate the system and each functional unit shall be provided. Procedures shall also be provided for initial tune-up of the system and adjustment and checkout required to ensure that the system is functioning within the performance requirements. Warning of special procedures shall be given. The functions and setting of all parameters shall be explained.

**Corrective Maintenance**

The manual shall include fault diagnostic and repair procedures to permit the location and correction of faults to the level of each replaceable module. Procedures shall include alignment and testing of the equipment following repair, the test equipment, tools, diagnostic software required and the test set up.

**Preventative Maintenance**

The manual shall include procedures for preventative maintenance in order to maintain the performance parameters of the system, equipment and cables within the requirements of the specifications.

**Parts List**

The manual shall include a list of all replaceable parts with exact parts description and number and a directory of recommended suppliers with correspondence address, telephone, and fax numbers.

**Test Results**

This section shall include a copy of the results for all the tests that have been conducted for the contract.

**Manuals**

Twelve complete sets of operation and maintenance manuals shall be provided. The manuals shall, as a minimum, include the following:

A. Complete and accurate Block Diagrams.
B. Complete installation and turn-on procedures.
C. Complete performance specifications (functional, electrical, mechanical, and environmental) identified by a universal part number such as JEDEC, RETMA, or EIA.
D. Complete stage-by-stage explanation and trouble-shooting procedures.
E. Complete stage-by-stage explanation of operation.

System schematic drawings shall be provided to identify the type of equipment at each location and the function of all equipment. The drawings shall also show how the system is interconnected. A comprehensive list of cabling and wiring shall be provided to clearly identify the interconnection and labeling of all equipment in the field.

**FINAL ACCEPTANCE**

The final acceptance of the system will not occur until all of the following conditions have been met as follows:

Physical, functional, and full performance acceptance tests have been completed and the Engineer approves the results.
All documentation has been completed and submitted to the Engineer.
All connections that were changed to perform acceptance tests are restored and tested.

Full compensation for system testing and documentation shall be considered as included in contract lump sum price paid for communication system routing (modify) and no additional compensation will be allowed therefor.

### 10-3.12 BONDING AND GROUNDING

Bonding and grounding shall conform to the provisions in Section 86-2.10, "Bonding and Grounding," of the Standard Specifications and these special provisions.

Bonding jumpers in standards with handholes and traffic pull box lid covers shall be attached by a UL listed lug using 4.5-mm diameter or larger brass or bronze bolts and shall run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the standard has been installed and the mortar pad and cap have been placed on the foundation.

Standards without handholes shall have bonding accomplished by jumpers attached to UL listed ground clamps on each anchor bolt.

For slip base standards or slip base inserts, bonding shall be accomplished by jumpers attached to UL listed ground clamps on each anchor bolt, or a UL listed lug attached to the bottom slip base plate with a 4.5-mm diameter or larger brass or bronze bolt.

Equipment bonding and grounding conductors are required in conduits, except when the conduits contain combinations of loop lead-in cable, fiber optic cable, or signal interconnect cable. A No. 8 minimum, bare copper wire shall run continuously in circuits, except for series lighting circuits, where No. 6 bare copper wire shall run continuously. The bonding wire size shall be increased to match the circuit breaker size in conformance with the Code, or shall be as shown on the plans. Conduits to be installed for future conductors, may omit the copper wire.

Bonding of metallic conduits in metal pull boxes shall be by means of bonding bushings and bonding jumpers connected to the bonding wire running in the conduit system.

### 10-3.13 DETECTORS

Loop detector lead-in cable shall be Type B.

Detector loops shall be Type E. For Type E detector loops, sides of the slot shall be vertical and the minimum radius of the slot entering and leaving the circular part of the loop shall be 40 mm. Slot width shall be a maximum of 20 mm. Loop wire for circular loops shall be Type 2. Depth of slots of circular loops shall be filled with hot melt rubberized asphalt sealant.

The depth of loop sealant above the top of the uppermost loop wire in the sawed slots shall be as shown on Standard Plans.

### 10-3.14 PAYMENT

The contract lump sum price paid for communication system routing (modify) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in communication system routing (modify), complete in place, as shown on the plans, as specified in the standard specifications and these special provisions, and as directed by the Engineer.

## SECTION 11. (BLANK)

## SECTION 12. (BLANK)

## SECTION 13. RELATIONS WITH RAILROAD

### 13.1.01 GENERAL

The Contractors attention is directed to the tracks and right of way of the Union Pacific Railroad, Metropolitan Transit Authority (Gold Line) and SCRRA Metrolink property, hereinafter referred to as "Railroad" at Route 5 within the limits of the project. There are six locations within the project limits where the work crosses over or under these railroads as follows:

Union Pacific Railroad @ Enchandia OH, PM 18.52
Union Pacific Railroad @ Alhambra Ave. OH, PM 18.96
Union Pacific Railroad @ Humboldt St. UP, PM 20.12
Metro Gold Line Railroad @Lacy St. UP, PM 20.26
Union Pacific Railroad & Metrolink R/R @Elysian Viaduct OH, PM 20.31
Union Pacific Railroad & Metrolink R/R @ Providencia OH, PM 28.70

In accordance with the provisions in Section 7-1.12, "Responsibility for Damage," of the Standard Specifications, the Contractor shall be responsible for all damages to Railroad track, structure, embankment and appurtenances thereto and to Railroad equipment operating on such track, resulting from his operations.

The Contractor shall not allow any personnel or equipment on Railroad right of way at track levels.

The Contractor shall conduct his operation in a manner that will prevent debris, or any other material, from falling on the tracks and right of way of the Railroad.

## SECTION 14 FEDERAL REQUIREMENTS FOR FEDERAL-AID CONSTRUCTION PROJECTS

**GENERAL**.—The work herein proposed will be financed in whole or in part with Federal funds, and therefore all of the statutes, rules and regulations promulgated by the Federal Government and applicable to work financed in whole or in part with Federal funds will apply to such work. The "Required Contract Provisions, Federal-Aid Construction Contracts, "Form FHWA 1273, are included in this Section 14. Whenever in said required contract provisions references are made to "SHA contracting officer," "SHA resident engineer," or "authorized representative of the SHA," such references shall be construed to mean "Engineer" as defined in Section 1-1.18 of the Standard Specifications.

**PERFORMANCE OF PREVIOUS CONTRACT**.—In addition to the provisions in Section II, "Nondiscrimination," and Section VII, "Subletting or Assigning the Contract," of the required contract provisions, the Contractor shall comply with the following:

The bidder shall execute the CERTIFICATION WITH REGARD TO THE PERFORMANCE OF PREVIOUS CONTRACTS OR SUBCONTRACTS SUBJECT TO THE EQUAL OPPORTUNITY CLAUSE AND THE FILING OF REQUIRED REPORTS located in the proposal. No request for subletting or assigning any portion of the contract in excess of $10,000 will be considered under the provisions of Section VII of the required contract provisions unless such request is accompanied by the CERTIFICATION referred to above, executed by the proposed subcontractor.

**NON-COLLUSION PROVISION**.—The provisions in this section are applicable to all contracts except contracts for Federal Aid Secondary projects.

Title 23, United States Code, Section 112, requires as a condition precedent to approval by the Federal Highway Administrator of the contract for this work that each bidder file a sworn statement executed by, or on behalf of, the person, firm, association, or corporation to whom such contract is to be awarded, certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the submitted bid. A form to make the non-collusion affidavit statement required by Section 112 as a certification under penalty of perjury rather than as a sworn statement as permitted by 28, USC, Sec. 1746, is included in the proposal.

**PARTICIPATION BY MINORITY BUSINESS ENTERPRISES IN SUBCONTRACTING**.—Part 23, Title 49, Code of Federal Regulations applies to this Federal-aid project. Pertinent sections of said Code are incorporated in part or in its entirety within other sections of these special provisions.

Schedule B—Information for Determining Joint Venture Eligibility

(This form need not be filled in if all joint venture firms are minority owned.)

1. Name of joint venture _____
2. Address of joint venture _____
3. Phone number of joint venture _____
4. Identify the firms which comprise the joint venture. (The MBE partner must complete Schedule A.) _____
   _____

   a. Describe the role of the MBE firm in the joint venture. _____
      _____
   b. Describe very briefly the experience and business qualifications of each non-MBE joint venturer: _____
      _____

5. Nature of the joint venture's business _____
   _____
6. Provide a copy of the joint venture agreement.
7. What is the claimed percentage of MBE ownership? _____
8. Ownership of joint venture: (This need not be filled in if described in the joint venture agreement, provided by question 6.).

   a. Profit and loss sharing.
   b. Capital contributions, including equipment.
   c. Other applicable ownership interests.

9. Control of and participation in this contract. Identify by name, race, sex, and "firm" those individuals (and their titles) who are responsible for day-to-day management and policy decision making, including, but not limited to, those with prime responsibility for:

   a. Financial decisions _____
   b. Management decisions, such as:

      (1) Estimating _____
      (2) Marketing and sales _____
      (3) Hiring and firing of management personnel _____
      _____
      (4) Purchasing of major items or supplies _____
      _____

   c. Supervision of field operations _____

Note.—If, after filing this Schedule B and before the completion of the joint venture's work on the contract covered by this regulation, there is any significant change in the information submitted, the joint venture must inform the grantee, either directly or through the prime contractor if the joint venture is a subcontractor.

**Affidavit**

"The undersigned swear that the foregoing statements are correct and include all material information necessary to identify and explain the terms and operation of our joint venture and the intended participation by each joint venturer in the undertaking. Further, the undersigned covenant and agree to provide to grantee current, complete and accurate information regarding actual joint venture work and the payment therefor and any proposed changes in any of the joint venture arrangements and to permit the audit and examination of the books, records and files of the joint venture, or those of each joint venturer relevant to the joint venture, by authorized representatives of the grantee or the Federal funding agency. Any material misrepresentation will be grounds for terminating any contract which may be awarded and for initiating action under Federal or State laws concerning false statements."

| | |
|---|---|
| Name of Firm | Name of Firm |
| Signature | Signature |
| Name | Name |
| Title | Title |
| Date | Date |

Date _____

State of _____

County of _____

On this ____ day of _____, 20___, before me appeared (Name) _____, to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

Date _____

State of _____

County of _____

On this ___ day of _____, 20___, before me appeared (Name) _____ to me personally known, who, being duly sworn, did execute the foregoing affidavit, and did state that he or she was properly authorized by (Name of firm) _____ to execute the affidavit and did so as his or her free act and deed.

Notary Public _____

Commission expires _____

[Seal]

## REQUIRED CONTRACT PROVISIONS
## FEDERAL-AID CONSTRUCTION CONTRACTS

### I. GENERAL

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

   Section I, paragraph 2;
   Section IV, paragraphs 1, 2, 3, 4, and 7;
   Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. Selection of Labor - During the performance of this contract, the contractor shall not:

   a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or

   b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

### II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, and 41 CFR 60) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

   a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

   b. The contractor will accept as his operating policy the following statement:

      "It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action

shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

   a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

   b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

   c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

   d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

   e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

   a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

   b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

   c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

   a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. **Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the SHA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

   a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

   b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

   c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

   a. The records kept by the contractor shall document the following:

      (1) The number of minority and non-minority group members and women employed in each work classification on the project;

      (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

      (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

      (4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

   b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

## III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of $10,000 or more and that it will retain such certifications in its files.

## IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

1. **General:**

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3)] issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c) the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

2. **Classification:**

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be

sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

3. **Payment of Fringe Benefits:**

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided, that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

4. **Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:**

a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in

the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. **Apprentices and Trainees (Programs of the U.S. DOT):**
Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. **Withholding:**
The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage

requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. **Overtime Requirements:**
No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

8. **Violation:**
Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of $10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

9. **Withholding for Unpaid Wages and Liquidated Damages:**
The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

## V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding $2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

1. **Compliance with Copeland Regulations (29 CFR 3):**

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

2. **Payrolls and Payroll Records:**

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show

that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less that the applicable wage rate and fringe benefits or cash equivalent for the classification of worked performed, as specified in the applicable wage determination incorporated into the contract.

e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

## VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than $1,000,000 (23 CFR 635) the contractor shall:

a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

## VII. SUBLETTING OR ASSIGNING THE CONTRACT

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635).

   a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.

   b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

## VIII. SAFETY - ACCIDENT PREVENTION

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of

compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

## IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

**Notice To All Personnel Engaged On Federal-Aid Highway Projects**

18 U.S.C. 1020 READS AS FOLLOWS:

"Whoever being an officer, agent, or employee of the United States, or any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined not more that $10,000 or imprisoned not more than 5 years or both."

## X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

(Applicable to all Federal-aid construction contracts and to all related subcontracts of $100,000 or more.)

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

## XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

1. **Instructions for Certification - Primary Covered Transactions:**
(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

2. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Primary Covered Transactions:**

a. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and

(4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

3. **Instructions for Certification - Lower Tier Covered Transactions:**
(Applicable to all subcontracts, purchase orders and other lower tier transactions of $25,000 or more - 49 CFR 29)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

4. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion — Lower Tier Covered Transactions:**

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

## FEDERAL-AID FEMALE AND MINORITY GOALS

In accordance with Section II, "Nondiscrimination," of "Required Contract Provisions Federal-aid Construction Contracts" the following are the goals for female utilization:

Goal for Women (applies nationwide).....(percent) 6.9

The following are goals for minority utilization:

### CALIFORNIA ECONOMIC AREA

| | | Goal (Percent) |
|---|---|---|
| **174** | **Redding, CA:** | |
| | Non-SMSA Counties | 6.8 |
| | CA Lassen; CA Modoc;CA Plumas;CA Shasta; CA Siskiyou; CA Tehama. | |
| **175** | **Eureka, CA** | |
| | Non-SMSA Counties | 6.6 |
| | CA Del Norte; CA Humboldt; CA Trinity. | |
| **176** | **San Francisco-Oakland-San Jose, CA:** | |
| | SMSA Counties: | |
| | 7120 Salinas-Seaside-Monterey, CA | 28.9 |
| | CA Monterey. | |
| | 7360 San Francisco-Oakland | 25.6 |
| | CA Alameda; CA Contra Costa; CA Marin; CA San Francisco; CA San Mateo. | |
| | 7400 San Jose, CA | 19.6 |
| | CA Santa Clara. | |
| | 7485 Santa Cruz, CA. | 14.9 |
| | CA Santa Cruz. | |
| | 7500 Santa Rosa, CA | 9.1 |
| | CA Sonoma. | |
| | 8720 Vallejo-Fairfield- Napa, CA | 17.1 |
| | CA Napa; CA Solano | |
| | Non-SMSA Counties | 23.2 |
| | CA Lake; CA Mendocino; CA San Benito | |
| **177** | **Sacramento, CA**: | |
| | SMSA Counties: | |
| | 6920 Sacramento, CA | 16.1 |
| | CA Placer; CA Sacramento; CA Yolo. | |
| | Non-SMSA Counties | 14.3 |
| | CA Butte; CA Colusa; CA El Dorado; CA Glenn; CA Nevada; CA Sierra; CA Sutter; CA Yuba. | |
| **178** | **Stockton-Modesto, CA:** | |
| | SMSA Counties: | |
| | 5170 Modesto, CA | 12.3 |
| | CA Stanislaus. | |
| | 8120 Stockton, CA | 24.3 |
| | CA San Joaquin. | |
| | Non-SMSA Counties | 19.8 |
| | CA Alpine; CA Amador; CA Calaveras; CA Mariposa;CA Merced; CA Tuolumne. | |

| | | Goal (Percent) |
|---|---|---|
| **179** | **Fresno-Bakersfield, CA** | |
| | SMSA Counties: | |
| | 0680 Bakersfield, CA | 19.1 |
| | CA Kern. | |
| | 2840 Fresno, CA | 26.1 |
| | CA Fresno. | |
| | Non-SMSA Counties | 23.6 |
| | CA Kings; CA Madera; CA Tulare. | |
| **180** | **Los Angeles, CA:** | |
| | SMSA Counties: | |
| | 0360 Anaheim-Santa Ana-Garden Grove, CA | 11.9 |
| | CA Orange. | |
| | 4480 Los Angeles-Long Beach, CA | 28.3 |
| | CA Los Angeles. | |
| | 6000 Oxnard-Simi Valley-Ventura, CA | 21.5 |
| | CA Ventura. | |
| | 6780 Riverside-San Bernardino-Ontario, CA. | 19.0 |
| | CA Riverside; CA San Bernardino. | |
| | 7480 Santa Barbara-Santa Maria-Lompoc, CA | 19.7 |
| | CA Santa Barbara. | |
| | Non-SMSA Counties | 24.6 |
| | CA Inyo; CA Mono; CA San Luis Obispo. | |
| **181** | **San Diego, CA:** | |
| | SMSA Counties | |
| | 7320 San Diego, CA. | 16.9 |
| | CA San Diego. | |
| | Non-SMSA Counties | 18.2 |
| | CA Imperial. | |

In addition to the reporting requirements set forth elsewhere in this contract the Contractor and subcontractors holding subcontracts, not including material suppliers, of $10,000 or more, shall submit for every month of July during which work is performed, employment data as contained under Form FHWA PR-1391 (Appendix C to 23 CFR, Part 230), and in accordance with the instructions included thereon.

## FEDERAL REQUIREMENT TRAINING SPECIAL PROVISIONS

As part of the Contractor's equal employment opportunity affirmative action program, training shall be provided as follows:

The Contractor shall provide on-the-job training to develop full journeymen in the types of trades or job classification involved.

The goal for the number of trainees or apprentices to be trained under the requirements of this special provision will be 22.

In the event the Contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees or apprentices are to be trained by the subcontractor, provided however, that the Contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The Contractor shall also insure that this Training Special Provision is made applicable to such subcontract. Where feasible, 25 percent of trainees or apprentices in each occupation shall be in their first year of apprenticeship or training.

The number of trainees or apprentices shall be distributed among the work classifications on the basis of the Contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing work, the Contractor shall submit to the Department for approval the number of trainees or apprentices to be trained in each selected classification and training program to be used. Furthermore, the Contractor shall specify the starting time for training in each of the classifications. The Contractor will be credited for each trainee or apprentice employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees or apprentices as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the Contractor shall make every effort to enroll minority and women trainees or apprentices (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees or apprentices) to the extent such persons are available within a reasonable area of recruitment. The Contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the Contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee or apprentice in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The Contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the Contractor's records should document the findings in each case.

The minimum length and type of training for each classification will be as established in the training program selected by the Contractor and approved by both the Department and the Federal Highway Administration. The Department and the Federal Highway Administration will approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the Contractor and to qualify the average trainee or apprentice for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with the State of California, Department of Industrial Relations, Division of Apprenticeship Standards recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the Contractor will be reimbursed 80 cents per hour of training given an employee on this contract in accordance with an approved training program. As approved by the Engineer, reimbursement will be made for training of persons in excess of the number specified herein. This reimbursement will be made even though the Contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the Contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the Contractor where he does one or more of the following and the trainees or apprentices are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or apprentice or pays the trainee's or apprentice's wages during the offsite training period.

No payment shall be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee or apprentice as a journeyman, is caused by the Contractor and evidences a lack of good faith on the part of the Contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee or apprentice

will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees or apprentices be on board for the entire length of the contract. A Contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees or apprentices specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Only trainees or apprentices registered in a program approved by the State of California's State Administrator of Apprenticeship may be employed on the project and said trainees or apprentices shall be paid the standard wage specified under the regulations of the craft or trade at which they are employed.

The Contractor shall furnish the trainee or apprentice a copy of the program he will follow in providing the training. The Contractor shall provide each trainee or apprentice with a certification showing the type and length of training satisfactorily completed.

The Contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.